

1952

QUEENSLAND

FIFTY-SECOND
ANNUAL REPORT OF THE BUREAU
OF SUGAR EXPERIMENT STATIONS

REPORT OF THE DIRECTOR
TO
THE HON. THE SECRETARY FOR AGRICULTURE AND STOCK

(As required by "The Sugar Experiment Stations Acts, 1900 to 1952")

BRISBANE



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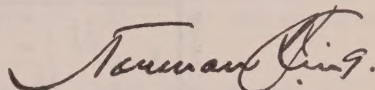
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FIFTY-SECOND ANNUAL REPORT OF THE BUREAU OF SUGAR EXPERIMENT STATIONS

TO THE HONOURABLE THE SECRETARY FOR AGRICULTURE AND STOCK

Dear Sir,—I have the honour to present the Fifty-second Annual Report of the Bureau of Sugar Experiment Stations, covering the period from 1st July, 1951, to 30th June, 1952.



Director.

Director's Report

GENERAL

The latter half of 1951, during which period the crop was harvested and crushed, provided a startling contrast to the conditions obtaining in the previous year. From a record cane harvest in 1950 the crop fell to 5,005,172 tons in 1951, the lowest since 1947. Dry conditions throughout the sugar belt combined with a severe winter in the southern districts progressively reduced crop expectations. The deterioration in crop production could not have occurred at a worse time. The industry was struggling to maintain some semblance of economic stability in the face of costs which were rising at an ever increasing rate. A good season in 1951 would not have been sufficient to have warded off the effects of the cost spiral, but it would probably have made less urgent the industry's application for a price increase. A larger crop, besides increasing the income per unit area, would have given more sugar for export at a more remunerative figure.

The season did not present any difficulties associated with harvesting such as were experienced during the very wet 1950 crushing. The major drawback was that crops were light and this was reflected in cane supply to factories. Whereas in the previous season the State's mills crushed, over a seven-week period, at the rate of 290,000 tons per week the best seven weeks in 1951 averaged only 266,000 tons and in no week attained 274,000 despite improvements in plant in the intervening twelve months.

One of the lessons to be learned from seasonal variability in the sugar industry, with its alternations of droughts and wet years, flood periods and frost visitations, is that an average season does not exist, nor can distant forecasts of production be based on what a given acreage may produce in an average season. It follows that the length of a crushing season cannot be linked closely with calculated milling capacity since experience demonstrates each year that crushing rate is largely dependent upon climatic and field conditions. Our home and overseas commitments, if they are to be met in full and with regularity, would need to be based on an acreage capable of producing the required sugar in a year of below average production. Such a basis would raise the problems of financing carry-over sugar after a good season and having mill capacity to treat a bumper crop from the full area. Should such problems not be solved it is unlikely that regularity in production will be achieved.

As was to be expected in a year of rainfall deficiency the quality ratio was more favourable. The tons of cane required to manufacture one ton of 94 n.t. sugar was 7.11 in contrast with the 7.61 of the previous year.

The start for the 1952 crop was not favoured by the dry spring and early summer of 1951. Both planting and ratooning were affected by the dry soil conditions and it was only in the "wet belt" from Babinda to Tully that early development of the crop proceeded normally. The short and, in some cases, late wet season early in 1952 provided below average precipitations in all districts and the bad effects of this were experienced principally in the Cairns, Ingham, Mackay and Bundaberg divisions. In the Lower Burdekin the short wet season favoured crop development as it usually does, while in the "wet belt" the absence of serious flooding and the fewer cloudy days benefited the crop.

CROP PROSPECTS, 1952 SEASON

The normal May, 1952, estimate of production showed that the 31 sugar mills of the State anticipated an aggregate crop amounting to 5,939,793 tons of cane for milling purposes. With a calculated quality ratio of approximately 7.4 such a crop would produce 800,000 tons of 94 n.t. sugar.

During the following three months it was possible to assess more accurately the tonnage available for harvest as well as the trend in cane quality, and by late August the figures set down in Table II were obtained. The increased figures were due to a very favourable autumn and winter in all districts, the absence of killing frosts in the southern areas and

TABLE 1.—RAINFALLS IN CHIEF CENTRES OF PRODUCTION DURING PERIOD JULY, 1951, TO JUNE, 1952, INCLUSIVE.
(Showing Rainfall (in Points), Number of Wet Days and Number of Days on which 20, or More, Points were Recorded, Monthly, for each 6-Month Period and for the Whole 12-Month Period).

Centre	July			August			September			October			November			December			Period: 6 months			January			February			March			April			May			June			Period: 6 Months			Period: 12 Months			Average Annual Rainfall
	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		Total Rain				
	A	B		A	B		A	B		A	B		A	B		A	B		A	B		A	B		A	B		A	B		A	B		A	B		A	B		A	B		A	B	A	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B						
Mossman	55	11	1	128	6	3	313	14	8	152	10	4	854	12	5	121	9	2	1,623	62	23	2,516	17	15	1,467	14	10	878	8	6	791	9	7	243	6	6	65	3	1	5,960	57	45	7,583	119	68	9,277
Cairns	116	10	2	48	7	0	537	17	10	177	11	4	496	7	6	54	6	0	1,428	58	22	2,714	16	13	997	16	10	840	12	7	686	12	9	565	13	10	112	6	2	5,914	75	51	7,342	133	73	8,673
Babinda	613	11	6	147	5	3	1,209	15	11	310	7	5	919	9	7	772	4	3	3,970	51	35	5,500	15	13	1,080	11	8	1,398	15	12	1,182	12	9	1,303	11	7	304	7	5	10,767	71	54	14,737	122	89	16,337
Innisfail	817	12	7	222	5	3	1,020	12	12	384	9	4	535	9	4	818	7	5	3,796	54	35	2,889	19	15	1,053	16	10	911	17	14	1,381	14	10	1,226	13	10	221	6	4	7,681	85	63	11,477	139	98	14,320
Tully	790	10	9	164	6	3	1,315	14	11	100	4	2	591	9	6	681	4	3	3,641	47	34	3,902	17	16	697	12	9	1,917	14	10	1,190	11	9	1,729	9	9	543	4	4	9,978	67	57	13,619	114	91	17,927
Ingham	42	1	1	100	5	2	212	12	3	28	3	0	200	4	2	131	7	2	713	32	10	2,726	13	12	283	12	6	712	12	6	258	12	3	182	6	4	210	5	3	4,371	60	34	5,084	92	44	8,005
Giru	33	1	1	80	1	1	0	0	0	33	1	1	0	0	0	103	2	2	249	5	5	1,616	8	8	1,011	8	8	226	3	3	474	4	3	53	1	1	122	3	2	3,502	27	25	3,751	32	30	5,091
Ayr	11	2	0	50	3	1	43	4	1	0	0	0	21	1	1	11	2	0	136	12	3	1,386	15	8	440	12	5	103	6	2	286	8	4	158	7	2	189	3	3	2,562	51	24	2,698	63	27	4,283
Proserpine	17	3	0	59	2	1	242	7	3	12	2	0	0	0	0	209	4	2	539	18	6	873	12	7	900	13	8	237	11	5	439	12	7	276	11	5	346	4	3	3,071	63	35	3,610	81	41	7,138
Mackay	29	5	0	16	2	0	143	8	2	36	5	1	2	1	0	385	11	6	611	32	9	947	15	6	1,078	16	8	331	19	4	445	16	8	211	12	4	317	5	3	3,329	83	33	3,940	115	42	6,575
Sarina	32	4	0	31	1	1	110	4	2	408	4	2	0	0	0	551	9	8	1,132	22	13	551	12	7	1,420	14	9	564	13	6	531	12	10	117	10	1	353	4	2	3,536	65	35	4,668	87	48	6,954
Bundaberg	54	3	1	83	4	1	55	2	1	77	10	1	116	4	1	244	6	3	629	29	8	521	9	3	240	12	4	1,487	12	6	627	13	4	412	14	5	169	5	3	3,456	65	25	4,085	94	33	4,341
Childers	17	2	0	73	5	1	94	2	1	147	8	2	88	3	2	209	6	3	628	26	9	507	7	4	277	9	5	1,784	8	5	498	12	3	607	12	8	163	3	3	3,836	51	28	4,464	77	37	4,197
Maryborough	12	2	0	56	4	1	55	4	1	90	10	0	50	5	1	189	8	3	452	33	6	565	8	7	418	14	3	2,159	15	6	393	16	3	576	13	7	225	4	3	4,336	66	29	4,788	99	35	4,545
Nambour	7	2	0	30	3	1	90	5	1	383	9	5	64	1	1	161	8	3	735	28	11	288	8	3	548	12	4	1,184	15	6	454	10	7	458	11	6	533	5	4	3,465	61	30	4,200	89	41	6,300
Beenleigh	9	1	0	65	4	1	167	3	1	98	5	2	9	1	0	113	4	2	461	18	6	154	5	2	302	4	3	475	10	4	471	9	4	411	7	6	180	4	3	1,993	39	22	2,454	57	28	4,770

Wet Days: Columns "A"—Total Days on which Rainfalls were recorded. Columns "B"—Totals Days on which 20, or more, points of rain were recorded.

the remarkable recovery made by Mackay and Bundaberg crops following the late wet season. The total expectation is now 6,402,000 tons of cane estimated to produce 853,000 tons of 94 n.t. sugar. These figures, if reached, will represent increases on 1951 production amounting to 1,397,000 tons of cane and 151,000 tons of 94 n.t. sugar respectively.

The big crops in some northern districts reflect not only the favourable growing conditions experienced but also the new acreage now coming into partial production. The August estimate figures show five mills with crops in excess of 300,000 tons and six with tonnages between 250,000 and 300,000. It appears almost certain that the record crushing of 353,000 established by Mulgrave in 1938 will be exceeded by Tully this year.

The central and southern district crops are well below the figures established in recent years. This state of affairs is due entirely to unfavourable seasonal conditions in the spring of 1951 and the following summer. Drought conditions combined with a late and subnormal wet season were responsible.

The three New South Wales mills are estimated to crush 149,000 tons of cane with a production of 18,000 tons of 94 n.t. sugar.

In Table II below are shown the individual Queensland mill estimates for 1952 as well as the actual crushings for the preceding year.

TABLE II
Sugar Cane Harvested, 1951—Estimated, 1952

Domestic Tonnages	Actual Tonnages		Mills	Estimated, 1952
	Accepted	Condemned		
111,119	111,119	0	Mossman	165,000
197,082	197,082	39	Hambledon	270,000
224,088	223,974	0	Mulgrave	285,000
187,205	187,205	0	Babinda	290,000
184,984	185,098	0	Goondi	250,000
272,658	272,658	0	South Johnstone	340,000
181,443	181,443	17	Mourilyan	220,000
248,046	248,046	25	Tully	376,000
279,713	279,713	0	Victoria	320,000
249,226	249,226	26*	Macknade	335,000
2,135,564	2,135,564	107*	..	2,851,000
94,638	94,638	64	Invicta	110,000
202,052	202,238	164	Pioneer	251,000
198,349	198,349	115*	Kalamia	290,000
314,500	314,500	68	Inkerman	325,000
809,539	809,725	411*	..	976,000
165,780	165,780	11	Proserpine	240,000
66,777	66,772	0	Cattle Creek	97,000
184,629	185,356	18	Farleigh	240,000
181,582	181,401	25	Racecourse	210,000
85,114	84,400	43	North Eton	87,000
154,441	154,063	67	Marian	190,000
189,863	190,238	33	Pleystowe	242,000
133,743	133,733	4	Plane Creek	220,000
1,161,929	1,161,743	201	..	1,526,000
71,304	71,151	7	Qunaba	76,000
173,746	174,042	147	Millaquin	208,000
190,824	190,881	429	Bingera	208,000
141,848	141,648	3,297	Fairymead	180,000
43,361	43,361	119	Gln Gin	45,000
151,355	151,260	45	Isis	140,000
46,957	47,052	145	Maryborough	67,000
70,447	70,447	150	Moreton	115,000
8,298	8,298	0	Rocky Point	10,000
898,140	898,140	4,339	..	1,049,000
5,005,172	5,005,172	5,058*	..	6,402,000

* Includes 26 tons lost in transit at Macknade and 14 tons unassigned cane at Kalamia.

1951 CROP STATISTICS

With the closure of Mt. Bauple mill the State's crop was handled during 1951 by 31 factories. The tonnage of cane crushed was 5,005,172 and, in addition, over 5,000 tons were condemned as being below the standard of quality required for minimum payment; of this appreciable total 3,300 tons were in one mill area where crops were subjected to killing frosts while still immature. The tonnage crushed was a reflection of the generally poor season experienced throughout the State and was 1,686,534 tons below that of the record 1950 year. It was the smallest crop produced since 1947.

In contrast with 1950 all available cane was harvested, there being only a small tonnage left to standover to 1952. In the southern district where two-year cane normally constitutes an important feature of the crop frost and drought combined to compel the harvesting of practically the entire tonnage. In conformity with usual practice the quantity of condemned cane has not been included in calculation of mill performance figures.

The small crop and the climatically favourable harvesting conditions allowed the mills to proceed without serious interruption. The first factory to begin crushing operations was Pioneer on May 23rd, but this was followed a week later by Tully, Victoria, Macknade and Inkerman. Nine mills started up in June, 15 in July and one each in August and September. The longest crushing experienced was 29 weeks at Inkerman. Only two other mills, South Johnstone and Tully, operated for twenty-five weeks and of the remaining 28 factories 18 did not experience a 20-weeks season.

The 94 n.t. sugar produced as a result of the 1951 manufacturing operations amounted to 704,342 tons, including 299 tons local sales. This was considerably below the 1950 production of 879,844 tons and was 192,925 tons lower than the record year of 1949. Such a rapid change in production over a period of only one year, with a practically unaltered harvested acreage, focusses attention on the variability of climatic factors in the sugar belt. The degree of stability enjoyed by the higher rainfall areas north of Townsville is more than counterbalanced by the fact that the greater proportion of the State's sugar is normally produced in the climatically unreliable areas of the central and southern districts. The season was characterised by relatively high sugar content of cane and the cane/sugar ratio showed a marked improvement to 7.11.

It is unlikely that the quality ratio in Queensland will fall below such a figure particularly in years of favourable production. The increasing use of hybrid cane varieties will tend to increase cane tonnages at the expense of quality. Table III illustrates the effect of the droughty and frosty year on production south of Townsville, and gives comparative figures over a six-year period. The 1951 sugar tonnage in the south of Townsville sector was a drop of 25 per cent. on the previous year.

TABLE III
Sugar Production (94 Net Titre), 1946-1951

Districts	1946	1947	1948*	1949*	1950*	1951*
North of Townsville ..	233,732	255,958	356,969	345,684	344,944	304,786
South of Townsville ..	278,354	315,700	553,080	551,583	534,900	399,556
Totals	512,086	671,658	910,049	897,267	879,844	704,342

* Includes Local Sales

The acreage harvested, although showing an increase over that of 1950 season, was similar in magnitude to 1949. As explained in the 1951 Report the drop of six and a half percent. in acreage harvested in the 1950 season was brought about by the wet harvesting conditions causing the standing over of considerable areas. This is shown in Table IIIa where it is seen that the proportion of standover acreage attained 8.7 per cent. as compared with 3.5 in the previous year. There was an increase in the ratoon acreage harvested in the Lower Burdekin, but the relevant figures of 53.6 per cent. for plant cane and 36.8 per cent. for ratoons are still capable of considerable improvement in view of the increasing popularity of the more vigorous Trojan and Pindar varieties. The ratio of plant to ratoon is still 1:0.69, whereas the theoretical ratio where one plant and two ratoon crops are grown is 1:2. For the whole State the ratio in 1951 was 1:1.53 while for the areas other than the Lower Burdekin the figures were 1:1.80. The standover cane has not been included in these ratios, as it is not recorded whether such crops are plant or ratoon cane.

TABLE IIIA
Classes of Cane Harvested, 1951

Districts	Plant Cane		Ratoons		Standover		Total Acres
	Acres	%	Acres	%	Acres	%	
Northern	36,900	36.2	64,340	63.0	793	.8	102,033
Burdekin	16,994	53.6	11,675	36.8	3,049	9.6	31,718
Mackay	33,948	36.6	48,128	51.8	10,799	11.6	92,875
Southern	10,617	23.1	26,871	57.5	9,057	19.4	46,745
Whole State	98,659	36.1	151,014	55.2	23,698	8.7	273,371

In Table IV are recorded the district figures for cane production and for cane and sugar per acre. It is here that the influence of the drought and frost is seen. Not only are central and southern district aggregate tonnages below normal but the unit production figures are well down on previous years. The most surprising drop in yield is shown for the Lower

Burdekin area where cane production fell from 35.76 tons per acre in 1950 to 25.52 in 1951. It is normally accepted that irrigation provides a stabilising influence on production, but these figures would suggest the intervention of some other factor than drought. The principal reason for the drop in acreage production in that area was the interference of the wet season with irrigation routine and the submergence of irrigation pumps by a rising water table. The net result was a considerable delay in retrieving the position brought about by excessive rains.

TABLE IV
Total and Average Yields by Districts, 1951

Districts	Tons of Cane	Tons Cane per Acre	Tons 94 N.T. Sugar per Acre
Mossman-Ingham	2,135,564	20.93	2.99
Lower Burdekin	809,539	25.52	3.76
Proserpine	165,780	12.33	1.79
Mackay	996,149	12.54	1.80
Bundaberg-Gin Gin	621,083	20.27	2.54
Childers-Maryborough	198,312	17.38	2.28
Nambour-Beenleigh	78,745	16.76	1.99
Whole State	5,005,172	18.31	2.58

The data in Table V sets out production statistics for the past ten years.

TABLE V
Acres Cultivated and Harvested, Yields of Cane and Sugar, Acre Yields and Quality of Cane, 1942-1951

Year	Acres* Cultivated	Acres Harvested for Milling	Total Yields		Yields per Acre		Tons Cane per ton Sugar
			Cane	Sugar	Cane	Sugar	
1942	316,798	238,213	4,350,642	605,680	18.26	2.54	7.18
1943	326,478	228,895	3,397,424	486,747	14.84	2.12	6.98
1944	317,386	222,215	4,398,190	643,540	19.79	2.90	6.83
1945	326,247	239,826	4,551,982	644,661	18.98	2.69	7.06
1946	317,766	228,395	3,714,475	512,086	16.26	2.24	7.25
1947	332,516	220,649	4,150,987	†571,658	18.81	2.59	7.26
1948	384,213	258,585	6,433,556	†910,049	24.88	3.52	7.07
1949	395,660	275,313	6,518,021	†897,267	23.67	3.26	7.26
1950	381,545	257,562	6,691,706	†879,844	25.98	3.42	7.61
1951	..	273,371	5,005,172	†704,342	18.31	2.58	7.11
Averages	..	244,302	4,921,215	685,587	20.14	2.81	7.18

* Supplied by Government Statistician.

† Includes Local Sales.

In the following molasses production and disposal table it will be noted that a slight increase—from 19 to 22 per cent.—has taken place in the proportion used as fertilizer. The proportion is still far too low, particularly when consideration is given to the potash requirements of cane growing soils and to the fertilizer value of the molasses. The drop in molasses production follows the lower tonnage of cane processed, and the smaller aggregate tonnage of molasses available has been met by reduced disposals to distilleries.

TABLE VI
DETAILS OF MOLASSES DISPOSALS FOR PERIOD 1942-1951

Usage	Tons of Molasses:—									
	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951
Distilleries	68,089	47,894	59,516	61,307	69,842	54,014	119,615	115,376	99,940	79,063
Fertilizer	12,092	13,837	17,885	20,095	18,938	23,276	34,655	49,293	36,446	34,529
Stock Feed	20,001	19,923	30,742	30,559	45,288	34,808	38,349	36,479	36,621	37,151
Mill Fuel	19,691	14,194	14,668	11,426	6,238	9,340	11,003	9,771	15,556	6,327
*Ferment	..	..	..	..	..	..	2,479	3,561	3,582	2,033
Other Purposes	1,974	2,879	1,657	2,765	1,575	2,047	161	1,204	231	9
Wasted	203	637	109	333	415	99	1,099	1,858	325	235
Totals	122,050	99,364	124,577	126,485	14,296	123,584	207,361	217,542	192,701	159,347

* Prior to 1948, Molasses used for cleaning ferment was included with that shown under heading "Other purposes."

SUGAR VALUES, 1951 SEASON

The Sugar Board has declared the final price for the 1951 season's sugar as follows:—

	No. 1 Pool			No. 2 Pool	Total
	Home Consumption	Surplus	Total	Excess	
Tons	549,557	152,108	701,665	2,378	704,043
Per cent. .. .	78.3218	21.6782	100	—	—
Price	£33 14 0	£36 15 6	£34 7 4	£36 15 6	£34 7 6

In addition the values for New South Wales production were:—

	Home Consumption	Surplus	Total
Tons	38,189	2,860	41,049
Per cent. .. .	93.0336	6.9664	100
Price	£33 14 0	£36 15 6	£33 18 3

Based on the above figures, the Queensland sugar production was valued at £24,201,478 and this was some £665,000 less than the previous year. The average overall price advanced by £6/2/2 per ton. New South Wales production added £1,392,074 to the value of the Australian crop.

The following Table summarises production and consumption figures and sugar values for the past ten years. A table of mill peak allocations is also given below to indicate the years in which various Mill Peak Schedules operated.

Year	Total Sugar Production at 94 n.t.	Total Sugar Exported at 94 n.t.	Average Australian Price	Average Export Price	Average Price No. 1 Pool Sugar	Average Price all Sugar	Total Value
			£ s. d.	£ s. d.	£ s. d.	£ s. d.	£
1942	605,361	188,080	22 14 6	10 16 3	19 1 0	19 0 6	11,516,000
1943	486,354	75,650	22 10 6	13 2 6	21 1 3	21 1 3	10,244,000
1944	643,475	208,679	22 2 0	15 0 6	19 18 1	19 16 1	12,744,000
1945	644,624	205,453	21 18 0	16 17 9	20 8 2	20 6 1	13,087,000
1946	512,035	72,578	21 18 0	21 10 0	21 16 11	21 16 10	11,184,000
1947	571,503	95,246	24 0 0	29 12 6	24 16 0	24 18 9	14,251,000
1948	909,896	440,814	23 1 0	28 2 0	24 17 0	25 9 11	23,198,000
1949	896,236	431,254	24 6 0	29 7 6	26 9 3	26 14 10	23,967,000
1950	879,689	395,151	24 11 0	32 16 6	28 4 1	28 5 4	24,866,000
1951	704,043	154,486	33 14 0	36 15 6	34 7 4	34 7 6	24,201,478

Table of Mill Peaks and of Proposed Ultimate Peak About 1954/1955

Mill	1929	1939	1949†	1950†	1952	Ultimate Mill Peak about 1954/1955††
Mossman	14,972	20,000	22,000	22,000	24,000	31,000
Hambleton	31,836	36,000	39,600	39,600	41,000	44,000
Mulgrave	31,643	36,000	40,100	40,100	40,500	47,500
Babinda	31,901	36,000	39,600	39,600	42,500	46,400
Goondi	27,034	29,500	32,400	32,400	34,500	38,000
South Johnstone	30,979	36,000	39,600	39,600	42,500	47,000
Mourilyan	23,630	27,000	29,700	29,700	31,000	34,000
Tully	30,930	38,000	42,100	42,100	45,000	47,000
Macknade	30,952	34,000	39,900	46,500	48,500	52,000
Victoria	32,221	37,500	43,600	49,100	52,000	82,000
Invicta	11,736	16,000	18,300	19,100	20,500	30,000
Kalamia	26,053	31,000	35,400	35,600	38,000	48,000
Pioneer	21,391	26,000	30,100	34,000	35,500	45,000
Inkerman	*24,207	31,000	36,800	42,000	45,000	50,000
Proserpine	16,650	23,000	26,300	33,000	35,000	43,000
Farleigh	16,993	23,000	27,600	32,400	33,500	42,000
Racecourse	18,066	24,000	29,000	35,200	36,500	40,000
Pleystowe	19,781	24,000	29,200	35,900	37,000	45,000
Marian	18,997	24,000	28,600	32,300	33,500	42,000
North Eton	9,319	12,000	14,500	15,900	17,500	26,000
Cattle Creek	8,791	12,000	13,400	14,100	14,500	20,000
Plane Creek	18,233	24,000	28,600	30,800	32,500	42,000
Fairymead	15,882	21,000	25,700	28,600	29,500	37,500
Qunaba	8,940	10,000	11,200	12,700	13,500	18,500

Table of Mill Peaks and of Proposed Ultimate Peak About 1954/1955 (Continued)

Mill	1929	1939	1949†	1950†	1952	Ultimate Mill Peak about 1954/1955††
Millaquin	14,443	19,000	24,100	29,600	31,000	37,000
Bingera	17,864	23,000	27,800	31,000	31,500	37,000
Gin Gin	6,000	6,500	8,000	8,400	9,000	12,500
Isis	28,011	27,000	30,000	30,200	31,500	35,000
Maryborough	3,862	7,500	9,500	9,500	12,500	20,000
Mount Bauple	6,231	6,500	7,200	7,200	—	—
Moreton	11,586	14,000	16,000	16,000	16,500	20,000
Eagleby	280	300	—	—	—	—
Rocky Point	2,014	2,200	2,700	2,700	2,780	3,200
	611,428	737,000	848,600	916,900	963,080	1,162,600

* Increased by 2,500 tons in 1938.

† Does not include 3 per cent. for Soldiers' Settlement.

†† Subject to provision made for the following being realised:—

- (1) Mill crushing capacity;
- (2) Assignment of suitable lands; and
- (3) Assignments being made effective.

REVIEW OF THE INDUSTRY

Home Consumption Price

Early in July, 1951, a new Commonwealth Sugar agreement was ratified under the terms of which the wholesale price of refined sugar was increased from £41/9/4 to £53/6/8 per ton. This, after allowing for increased margins to wholesalers and retailers, was equivalent to a retail price of 6½d. per lb. in capital cities. The rapidity of cost increases in growing milling and refining during the following six months induced industry organisations to prepare a further case for presentation to government circles. This was submitted to the State Government on January 25th, forwarded to the Federal Government on February 1st, and a deputation led by the Minister for Agriculture and Stock met the Prime Minister on February 7th.

The industry's case requested an immediate rise of 2d. per lb. in the retail price of refined sugar. On March 18th the Prime Minister announced an interim increase of 1½d. per lb. in the retail price and at the same time made public the Government's intention to appoint a Committee of Inquiry into the sugar industry, which body would report to the Federal Government on the necessity for further price increases. The interim price increase granted raised the wholesale refined price to £65/12/- per ton.

The Committee subsequently took evidence in various sugar centres as well as in Brisbane, Sydney and Melbourne. It eventually submitted an interim report to the Government in July, 1952.

The Empire Sugar Agreement

A matter of far reaching importance to the Queensland sugar industry was the signing in England on December 21st, 1951, of the Empire Sugar Agreement. This is a multi-lateral agreement which covers exports of British Commonwealth sugar up to December 31st, 1959. Although agreement on most points had been reached at the previous talks with the British Food Ministry the negotiations subsequently carried out made necessary further conferences to ensure ratification on bases satisfactory to all Empire producing countries. At the same time the export price for 1952 was negotiated.

Besides dealing with quotas the Agreement provides for the incorporation of the principles of the Commonwealth Sugar Agreement in any new International Sugar Agreement. The Australian quota of 600,000 tons includes 314,000 at a negotiated price and this tonnage is irreducible. The remainder will, after December 31st, 1952, be sold on a normal commercial basis, but will naturally go to the preferential markets where we obtain the benefit from tariff preferences.

Two important items in the Agreement are the price uniformity clause and the basing of future prices on a formula. The former ensures that all Commonwealth exporting countries will receive the same price which will reflect changes in the levels of wages and other cost factors relating to export sugar. The 1952 export price, negotiated in November, 1951, will be £38/10/- stg. per ton and represents an increase of £5/12/6 stg. over the 1951 price. This figure should provide in Australian currency a net price of somewhere between £39 and £40 per ton for export sugar during the calendar year 1952.

New Status of the Bureau of Sugar Experiment Stations.

Subsequent upon the passing of "The Sugar Experiment Stations Acts Amendment Act of 1951" the Bureau, after some fifty-one years of existence under Government control was handed over to the administration of the Sugar Experiment Stations Board. Although industry representation is numerically less than on the previous Advisory Board, its function is no longer advisory but administrative,

The changeover, which was made smoothly and without interruption to operations, has introduced a degree of flexibility which has benefited the Bureau's work for the industry. The Board meets quarterly to discuss and lay down general policy, but matters of urgency arising between meetings are determined without delay. Although no longer a government instrumentality the Bureau receives sympathetic consideration from governmental bodies because of its value to such an important primary industry.

Bulk Sugar Handling

Some historical significance attaches to the first bulk sugar shipment to leave a Queensland port. This experimental consignment of 9,574 tons was loaded on the S.S. Artemisia in November, 1951, for shipment from Mackay to London. In the absence of proper facilities the sacks of sugar were opened above the hatches and the sugar poured into the holds. Hand trimming was resorted to for levelling out the mounds.

Reports received subsequently from England stated that the shipment could be regarded as very satisfactory. The sugar arrived in good condition, did not set in transit and did not adhere to the sides of the holds. This was one of a number of similar bulk shipments made to England in the past two or three years from Fiji, Dominican Republic, Trinidad and Jamaica. In the coming season further bulk shipments are planned to leave Queensland ports and it is possible that some attempt may be made to introduce some bulk transport between mill and ship.

British refiners are anxious to receive increased bulk shipments and Tate & Lyle Ltd. report that they are joining with United Molasses Co. and the West Indies Sugar Co. to build a fleet of six ships specially designed to carry bulk sugar and with a capacity of 9,000 tons each.

There is now little doubt that the practice of handling raw sugar in bulk will be introduced into some Queensland ports, the most favoured ones at the moment being Mackay and Lucinda. Installation costs of bulk storage and of loading machinery will be high, but considerable savings are anticipated from reduced sack usage, handling charges and quicker turn-round of ships.

Royal Commission

The Commission appointed by the State Government in 1950 to enquire into certain matters concerning the sugar industry submitted its report in August, 1951. The Commissioners recommended *inter alia* that—

- (a) No new sugar mills be erected in the period 1951 to 1962.
- (b) An increase be made in the Central Sugar Cane Prices Board's assessment of what constitutes a living area when granting new or increased assignments.
- (c) Where possible small mills be enlarged to a reasonable capacity, but only to the extent to which suitable lands are available.
- (d) In the public interest the Tully mill be duplicated and that the Tully Co-operative Sugar Milling Assn. be requested by the Government to participate in a very detailed consideration of the proposal to duplicate Tully mill.
- (e) If the establishment of a new mill be found to be uneconomic in the period between 1962 and 1975 the Macknade sugar mill be duplicated.

Subsequently the State Government appointed a committee to investigate the proposed duplication of Tully mill. It is comprised of Mr. Justice Mansfield as Chairman, Mr. P. J. Donnollan and Mr. H. N. Lund.

New Mill Peaks

Following the hearing in March, 1952, of appeals under Section 12A of the "Regulation of Sugar Cane Prices Acts, 1915-1948," the Central Cane Prices Board recommended to the Government certain alterations in the mill peak schedules relating both to 1952 season and to the period 1954/55. The recommendations were based on the Empire agreement which provided for an annual overseas commitment, after 1952, of 618,000 tons of 94 n.t. sugar and an anticipated home consumption in 1952 of 550,000 tons with a probable annual increase of 12,000 to 15,000 tons due to population increase. In the new schedule the 1950 aggregate peak of 916,900 tons has been increased for 1952 season to 963,080. The ultimate mill peaks for the period about 1954/55 have also been increased in most cases and, leaving out Cattle Creek, Marian and Pleystowe which are temporarily deferred, the increase over the 1953 ultimate mill peaks is 95,100 tons. The New South Wales allocation has been reduced from 55,000 to 45,000 tons. Detailed figures are shown in the table on pages 8 and 9.

It is apparent from the figures cited that by the time the 1954/55 ultimate peaks are achieved many of the Queensland mills will be approaching, if they have not then reached, the limit of a single milling train. Should the increase in home consumption be maintained urgent consideration will then have to be given to duplication or to new mill construction.

WORK OF THE BUREAU

After the past eight or nine years which were marked by a succession of staff losses and changes the year under review appears as a return to more normal conditions. The only losses were an Assistant Agronomist and two typistes, and replacements have been made in each case. In addition an extra typiste and a junior clerk were appointed to Head Office and one cadet was added to the field extension staff. Mr. J. C. Skinner, who is overseas on a two-year genetics scholarship at Manchester, has continued his studies and will return to Queensland early in 1953.

The development of the Lower Burdekin Sugar Experiment Station proceeded at an increased tempo during the year as a result of more field labour being available. A further 22 acres were planted in the autumn of 1952 and the underground irrigation main was extended to look after the increased area. An office-laboratory building was constructed, and with further expansion and improvement during the next year or two this Station will take its place as an important unit in the Bureau's investigational work.

The part which Queensland-produced varieties play in the industrial economy becomes more important year by year. In the 1951 harvest locally bred canes constituted 68.5 per cent. of the crop and the percentage was appreciably decreased by the poor season in Mackay and the smaller tonnage of Q.50 milled. There is little doubt that with the extension of Q.50 in both north and south Queensland and the increasing popularity of Pindar in the Lower Burdekin the proportion of Queensland varieties will continue to increase.

The Bureau's oft-repeated advice to the industry to grow velvet beans as a green manure fallow crop is being accepted to a greater extent than heretofore. The scattered plantings made in the past few years in all districts have proved so successful over a range of seasons and conditions varying from drought to water-logged soils that demand for seed now far exceeds supply. The commercial seed growers of the State have so far failed to recognise the market which exists and cane growers are largely dependent for supplies on seed grown and processed in cane growing areas. The resistance of velvet beans to bean-fly, wilt, drought and wet conditions combined with their ability to produce very heavy crops of nitrogen-rich organic matter places them in a class superior to the various types of cowpeas previously grown.

The gradual potash depletion of sugar cane soils commented upon in the last Annual Report has continued in the past year. There is little doubt that the unfavourable financial position of the cane growers has, to some extent, influenced the type of fertilizer being purchased. Fertilizers with high potash content are considerably dearer than those containing a lower percentage and consequently many soils are being starved of this essential ingredient and overfed with phosphates which are, in some cases, not so necessary. It is a matter for trenchant criticism that most of the molasses produced in the industry, which could be used to raise the potash status of the district soils, is sold for other purposes instead of being returned to the farm. The economics of recovery of potash from distillery wastes were found, some years ago, to be unfavourable; steep rises in potash value since that time makes desirable a re-examination of the figures. Improved technical processes for recovery, including ion exchange methods, are also worthy of investigation.

Weed control with 2,4-D developed rapidly during the year. Experiment Station demonstrations combined with farm trials influenced a considerable number of growers to procure or construct boom sprays. In the main the results have been good and the few partial failures have been due to lack of correct timing or inefficient application. Irrigated farms present a particular problem owing to the soil movement brought about by flowing water.

Laboratory soils investigations were directed along three distinct, but to some extent interconnected, lines of work. Long overdue studies on decomposition of various plant and by-product materials in the soil may give valuable information on soil processes. The study of clay minerals occurring in district soils will classify them on this basis and should result in a better understanding of the causes of intractability in cultivation, while the experiments with Krilium will allow some preliminary assessment of its possible value before the product is available commercially. The Bureau was fortunate in obtaining an early sample of this newly-discovered soil conditioner and has already arranged for a full-scale field trial with larger quantities which are expected in the near future.

Following on the previous year's laboratory study of activated magnesium oxide as a clarifying agent in sugar mill practice, a plant-scale trial was carried out at a small factory during the 1951 season. The process was found to be practicable under the difficult conditions which applied to the test run and the results showed that, as a clarificant, the activated magnesia was superior to lime. The cost of the magnesium oxide rendered the process uneconomical, but since the method is employed commercially in some overseas factories it is logical to assume that the position in Queensland could change with large scale production of the activated material in this country.

Benzene hexachloride (BHC) has continued as a highly efficient protection against white grub damage and more recently developed insecticides have shown no advantages either in efficiency or price. Although the BHC treatment is a very economic one enquiries have been

pursued with a view to obtaining a more concentrated product, the use of which would reduce costs even further. A BHC concentrate containing 70 per cent. of the gamma isomer is being manufactured overseas and should this become available at the quoted price the cost per acre could be appreciably curtailed.

Studies on ratoon stunting disease continued during the year and some headway was made towards a better understanding of this virus and of the resistance and susceptibility of many of our commercial varieties. The discovery that a cure can be effected by hot water treatment of cane setts provides a means of establishing clean stocks of any variety carrying the disease and ensures that a variety which has become badly affected may be recovered. The establishment of a symptom of the disease in the stalk tissues has assisted considerably in detecting the presence of the virus, but it was disturbing to find that what was previously thought to be a somewhat localised affection is widespread throughout the sugar belt. Ratoon stunting disease must now be looked upon as the major pathological problem of the industry. There is now little doubt that it is not a new disease as has been accepted since the first finding in the variety Q.28 in 1945; present indications are that it has been present in the industry for many years and is perhaps the reason for the marked drop in yielding capacity from plant to ratoon crops.

The problem of varietal yield deterioration which is exercising the minds of sugar cane agriculturists throughout the world became a new subject of study. For the first time in over twenty years expansion of the lands under sugar cane is providing means to assess performance, under virgin soil conditions, of varieties claimed to be deteriorated. The investigation in this and future years will proceed hand in hand with the studies on ratoon stunting disease since experience to date points to a close relationship between the two problems. Bureau workers have held the opinion for some time that varietal yield deterioration is probably associated with previously undetected virus diseases and that these are the reason for the mysterious falling off in yield of newly produced seedling varieties.

In furtherance of the policy laid down some years ago the major efforts of the field staff were directed towards varietal improvement. Large numbers of varietal plantings and trials were made to exploit thoroughly the seedling material produced on the Experiment Stations, and the canes imported from abroad. The most promising variety produced by the Bureau for North Queensland conditions is being propagated as rapidly as possible in the areas from Ayr north. This is Q.57 which appears to possess most of the attributes of a satisfactory cane variety.

In all areas the varietal work has to be considered hand in hand with the recent developments in ratoon stunting disease, and no doubt plans will be subjected periodically to change in the light of altering circumstances. In the central and southern districts where arrangements were in train for distribution of Q.56 and N.Co.310 respectively the incidence of ratoon stunting disease caused postponement of release.

In the field of cane breeding some disappointment must attach to the conclusion, reached after years of trial, that *S. robustum* species are not exhibiting any great promise in cane breeding work. To date the clones used have been from the 1923 New Guinea collection and those from the 1951 expedition have yet to be examined over a protracted period. Although, in general, the robustum type wild cane has been built up by cross breeding to a good sugar content, it has failed to confer on its progeny the factor of good stooling. The giant robustum collected in 1951 may carry more favourable characters.

A close examination of the "variety" Badila in North Queensland disclosed that five separate and distinct Badila types exist, and the examination was by no means exhaustive. The distinction between Badila and Badila Seedling has always been recognised, and it is probable that the latter was a separate introduction from New Guinea or a seedling produced in Queensland. The source of the others is a matter for conjecture. "Oba" Badila was so named in the 1914 New Guinea collection and was recorded under the number 14 N.G.188, although it was, at that time, considered identical with Badila (N.G.15). The other two types which have been differentiated could be (a) separate introductions which have since become mixed with Badila plantings, (b) sports of the original Badila, or (c) seedlings raised from Badila parentage. Their interest to the cane breeder lies at the moment in discovering which is the better parent for future cross pollination work. A varietal trial has already been established with a view to assessing the relative yielding power of "Badilas" from various sources.

Sugar cane pathology research in general will receive an impetus as a result of the construction during the past year of two new glasshouses in Brisbane. It has already been established that the two years or more required for testing of Fiji resistance in open-field plantings can be reduced to six months under glasshouse conditions. In addition the long overdue investigations into the cause and spread of chlorotic streak disease can be undertaken. Glasshouse conditions are more favourable to such studies than are outside plantings since soil moisture is easily controlled, a range of soil types or textures can be used, plants are not subject to the dangers of drought, frost or flood and insect transmission experiments can be kept under constant observation.

The finding of leaf scald disease in the Moreton district, after a lapse of twenty years since it was recorded in commercial plantings in South Queensland, should convince Cane Pest and Disease Control Boards and growers' organisations of the insurance value of district-wide field inspections. Such outbreaks, if not detected early, could result in serious district losses,

This finding, when no leaf scald was suspected of existing on cane farms south of Townsville, also highlighted the necessity for Disease Board inspectors to be acquainted with the symptoms of all Queensland cane diseases to ensure immediate recognition.

PUBLICATIONS BY BUREAU STAFF

Members of the Bureau staff made the following contributions to technical sugar literature during the year:—

To the Proceedings of the Queensland Society of Sugar Cane Technologists—

- Buzacott, J. H.—Varietal Changes in the Burdekin District.
 Claire, A.G.—The Keeping Qualities of First Expressed Juice.
 King, N. J.—Factors Affecting the Germination of the Sugar Cane Plant.
 Nicklin, J. H.—Large Low Voltage Alternators.
 Smith, N. McD.—Some Observations on Frost Injury to Sugar Cane.
 Venton, C. B.—Further Experience with the Douwes-Dekker Formula.
 Wilson, G.—Benzene Hexachloride for Cane Grub Control—Variations from Standard Methods of Application and Disadvantages Arising Therefrom.

In addition the Bureau issued the following publications:—

- Farm Bulletin No. 12.—Chemical Sprays for Weed Control, by L. G. Vallance.
 Operations Report 52/1.—Heat Transfer in Werkspoor Crystallizer's.
 Operations Report 52/2.—Sugar Deterioration.
 Operations Report 52/3.—Condenser Tests.
 Operations Report 52/4.—Boiler Evaporation Tests.
 Four issues of the Cane Growers' Quarterly Bulletin and two issues of the Newsletter were published.

APPENDICES

The Bureau levy for the 1951 season was made at the rate of threepence per ton of cane, this amount being paid in equal proportions by miller and grower. Receipts and disbursements for the year under review are shown in Appendix I. For the benefit of readers outside Queensland the derivation of the c.c.s. formula is given in Appendix II.

Appendix I

"The Sugar Experiment Stations Acts, 1900 to 1952"

Statement of Receipts and Disbursements of Funds of the Sugar Experiment Stations Board for the Period 1st JULY, 1951, TO 30th JUNE, 1952

Receipts				Disbursements			
		£	s. d.			£	s. d.
To Balance "Sugar Fund," 1-7-51 ..		41,564	10 1	By Salaries		41,242	12 0
" Assessments		62,572	2 6	" Contingencies		28,453	9 2
" Endowment		7,000	0 0	" Ayr		8,157	0 1
" Ayr		1,195	10 1	" Bundaberg		5,083	10 3
" Bundaberg		2,293	10 1	" Mackay		6,240	18 1
" Mackay		1,968	11 5	" Meringa		8,079	18 4
" Meringa		2,389	1 5			97,257	7 11
" Sundries		1,703	3 5	" Balance, 30-6-52		23,429	1 1
		<u>£120,686</u>	<u>9 0</u>			<u>£120,686</u>	<u>9 0</u>

Appendix II

C.C.S. FORMULA

$$\text{C.C.S. in cane} = \text{Pol in cane} - \frac{\text{Soluble impurities in cane}}{2}$$

In practice, per cent. C.C.S. is calculated by the empirical formula—

$$\text{C.C.S.} = \frac{3P}{2} \left(1 - \frac{5+F}{100} \right) - \frac{B}{2} \left(1 - \frac{3+F}{100} \right)$$

where—

- P = pol in first expressed juice.
 B = brix in first expressed juice.
 F = fibre in cane.

Division of Soils and Agriculture

Soil Technology and Experiment Stations Report

(By L. G. VALLANCE, Assistant Director)

ANALYTICAL WORK

The following is a summary of the analytical work performed at the Brisbane Laboratory for the period 1st July, 1951, to 30th June, 1952:—

Soils	No. of Samples
Farmers' samples	434
Fertility surveys	23
Experimental plots	88
Miscellaneous	
Cane leaves	326
Mill by-products	7
Waters	33
Other samples	12
Total	923

SOILS INVESTIGATIONS

A review of the fertility trend of the soil samples analysed during the year again indicates that potash deficiency is more pronounced than that of phosphate. This seems particularly the case in the far north. The samples which were analysed from the delta soils of the Lower Burdekin show no diminution of the high phosphate and potash status which is characteristic of this important sugar producing area. Soils from the Mackay area were consistently low in both phosphate and potash and emphasised the need for the use of balanced fertilizer mixtures. The figures indicating the percentage of samples at the various fertility levels for the major districts are given in the following Table:—

District	Phosphate			Potash			No. of Samples
	Low	Fair	Good	Low	Fair	Good	
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	
Mossman-Babinda ..	20	27	53	50	30	20	64
Innisfail	23	15	62	44	26	30	108
Ayr	5	5	90	8	8	84	38
Mackay	51	24	25	67	12	21	66
Bundaberg	40	10	50	47	12	41	154
Southern	38	19	43	43	19	38	21
Total	32	16	52	46	18	36	451

Fertilizer Trials

An outstanding feature of the 1951 season was the unfavourable weather conditions that prevailed in most districts. The unfortunate extremes of very wet and very dry weather which occurred in the early and late stages respectively of the growth of the crop seriously reduced yields of both cane and sugar. At the same time it affected the farm trial programme, and erratic growth militated against obtaining conclusive results in some carefully laid out experiments. However, it was possible to harvest factorial fertilizer trials from the following districts: Babinda, Goondi, Mourilyan, Proserpine, Isis, and Bli Bli. In general the results of these six experiments reveal the necessity for using sufficient sulphate of ammonia and, once again, the need for potash fertilizer overshadowed that for superphosphate. The detailed calculations showed that profits per acre were vitally affected by steep rises in the cost of fertilizer. The effect of this latter factor is now very strongly pronounced and unless due precaution is taken to use only the correct types and amounts, the profit due to fertilizer response is disproportionate to its cost of application.

Lime Trials

The plant crops of a series of lime trials which had been laid down in several areas were harvested during the year. These were designed to determine whether a light dressing in the cane drill would be as effective as the usual heavier dressing applied broadcast. If such were the case an appreciable reduction in the cost of lime application might be possible. At this

present stage only the plant crops have been harvested and the trials will be continued to the ratoon crops before any conclusions are reached. However, in order to convey some idea of the magnitude of the difference due to the various treatments, the average yields are given below:—

Treatments (per acre)	District Averages (tons cane per acre)			
	Cairns (5 Trials)	Innisfail (5 Trials)	Mackay (4 Trials)	Bundaberg (3 Trials)
2 tons lime broadcast	28.16	32.04	22.64	29.88
10 cwt. lime in drill	25.83	30.74	21.66	30.23
5 cwt. lime in drill	24.89	31.49	20.47	29.13
No lime	24.50	30.05	20.93	29.70

Clay Mineral Studies

In order to obtain information regarding the fundamental nature of the clay in sugar cane soils, a series of investigations was begun during the year and twenty-seven soils of varying physical characteristics have already been studied. The main technique used was that of differential thermal analysis the results of which have been supported by determinations of base exchange capacity, crystal lattice water and non-replaceable potash. The close relationship which exists between clay mineral content and the physical properties of a soil is well known, and it is hoped that these studies will lead to a better understanding of the behaviour of our soils under cultivation.

Present indications show that, according to the type of clay mineral present, the soils examined may be divided into three groups as follows:—

Group A—Clay mineral predominantly **kaolin** type. A very small amount of hydrous mica and montmorillonoid material may be present.

Group B—Clay mineral predominantly **kaolin plus hydrous mica** with a slightly greater proportion of the former. Montmorillonoid material usually absent.

Group C—An appreciable **montmorillonoid** content. Hydrous mica present in lesser amount. Kaolin content is still considerable, ranging from 40 to 50 per cent.

Soils belonging to the first group include volcanic soils from all districts, schist soils, red and yellow forest soils of the Bundaberg area and the alluvials of the Mulgrave and Russell Rivers. In group B are placed certain soils of the Mossman district while the last group includes some alluvials of the Burnett and Burdekin Rivers and the grey forest alluvials of the Mackay district. It is of considerable interest to note that the samples from the first group represent soils of excellent physical condition and are from sites well known to be particularly amenable to continuous cultivation. The soils of the third group in which an appreciable amount of montmorillonoid clay was found were taken from areas characterised by intractability and difficulty of working.

Oxides of iron were also found to be present in amounts ranging up to 15 per cent. Gibbsite, a hydrated oxide of aluminium, has been detected in nearly all of the soils to the north of Ingham, but has not been found in any of the southern samples.

Study of Rate of Decomposition of Organic Materials

These studies were begun last year, and the rate of decomposition of organic matter such as Poona pea, molasses, cane trash, bagasse and filtermud when turned under in a red volcanic soil was previously reported upon. During the year, the work was extended to include other soil types and the percentage of the various materials which had decomposed in a period of approximately 100 days after turning under is as follows:—

Soil Type	Percentage decomposed				
	Molasses	Poona Pea	Trash	Bagasse	Filter Mud
Red volcanic	65	63	45	48	38
Buff alluvial	52	49	41	50	41
Red brown schist	80	54	48	52	36
Burnett alluvial	65	..	49	53	50

These figures indicate that, under the laboratory conditions of the experiment, a large portion of these organic materials had been completely decomposed and evolved from the soil as carbon dioxide within a period of about three months. The rate of decomposition was greatest in the more nitrogenous substances, i.e., molasses and Poona pea.

Foliar Diagnosis

A considerable amount of time was devoted to the determination of the nitrogen, phosphate and potash contents of cane leaves from selected fields in the Babinda area. This particular district invariably experiences low c.c.s. figures and it was felt that a "foliar diagnosis" survey might reveal some general nutritional deficiency, particularly when cane from

fields which are usually above normal in sugar yields was compared with those characterised by lower values. Conclusions cannot be reached until the trial areas are finally harvested, but the figures to date seem to indicate that the cane is normal as far as the content of the major plant foods is concerned and that there is no apparent difference in nutritional status. However leaf analyses are also being carried out on a factorial fertilizer trial which has been laid down in this area and the figures from this trial will be used to obtain data for leaf diagnosis having due regard to nutrient levels as indicated by fertilizer response.

Studies on Soil Physical Condition

Investigational work on the amelioration of poor physical condition in cultivated soils was continued during the year. A field trial to ascertain the effect of velvet bean, sweet sorghum and a combination of bean and sorghum crops was set out on Mackay Station. Unfortunately, the very unfavourable weather conditions completely ruined the initial experiment and the area had to be replanted. A further phase of this type of work which is of considerable interest is the investigation of the soil conditioning powers of the sodium salt of hydrolized polyacrylonitrile (Krilium). Laboratory tests to date on a particularly intractable non-aggregated Burdekin soil have resulted in a considerable improvement in structural aggregation and water percolation. However, similar results were not obtained on a heavy Burnett River alluvial and this is probably due to a difference in the nature of the mineral colloids of these two soils. It is intended to extend the work to field scale trials as soon as adequate supplies of the conditioner arrive as it is felt, particularly in the case of the latter soil, that laboratory tests alone are not necessarily a satisfactory measure of soil improvement.

Weedicides

As was reported last year, the use of chemical methods for weed control has progressed beyond the investigational stage and interest has centred largely around demonstrational and advisory work. It may be stated however that observations during the twelve months have confirmed previous opinion of the usefulness of the method on very many farm properties. With the reduction that has occurred in the price of 2,4-D many growers are adopting it as a routine farm operation and although some failures have been recorded, in practically every instance the lack of control could be traced to inefficient application.



Fig. 1

The new office-laboratory building at the Lower Burdekin Sugar Experiment Station. This has been designed to provide adequate office and laboratory space upstairs, while the crushing mill and juice analysis materials are housed in the lower story.



Fig. 2

Burdekin alluvial loam. To the sample on the left has been added 0.05 per cent. Krilium, which is equivalent to about 500 lb. per acre worked in to a depth of four inches. Note the loose friable crumb structure as compared with the hard cloddy nature of the untreated sample on the right.

NORTHERN SUGAR EXPERIMENT STATION

(G. BATES, Senior Adviser, Officer in Charge)

METEOROLOGICAL AND CROP GROWTH REPORT

Rainfall during the year was 52.86 inches which was much below the average of 73.92 inches over the past 28 years. This was due to the cessation of the wet season in January, there being relatively light falls registered in February and March compared with the usual large recordings. The season commenced well; 332 points were registered in September and this gave the 1952 crop a good start. It was followed by 139 points in October and 291 points in November. At this stage prospects looked very bright, but unfortunately only 10 points of rain were recorded in December which is one of the important growing months. By the time the wet season rains commenced on January 11th, crops had received a setback. Twenty inches fell in January and the wet season tailed off sharply to only 8.35 inches in February and 5.90 inches in March compared with an average over the past 28 years of 18.88 and 15.19 inches respectively for these two months.

Growth of cane was slow during February and March and early crop estimates had to be reduced. However, this was offset by favourable early winter weather which caused crops to make a lot of late growth. With the early cessation of the wet season a big percentage of very early planting was done. Some trouble was experienced from pineapple disease and many growers rapidly adopted the treatment of setts with organic mercurial compounds as a protection against bad strikes. Arrowing was early, and intensive, particularly in the wet area of Babinda where varieties including Q.44, Q.50, Pindar and Trojan flowered freely.

The following tables show the rainfall records taken at the Northern Sugar Experiment Station over the past 28 years and an abstract of other meteorological observations:—

Rainfall Records at Northern Sugar Experiment Station for the Past 28 Years

Year	Rainfall in Inches	Year	Rainfall in Inches
1924-25	82.86	1938-39	126.79
1925-26	49.02	1939-40	82.10
1926-27	80.34	1940-41	80.59
1927-28	72.46	1941-42	41.55
1928-29	92.83	1942-43	64.60
1929-30	69.99	1943-44	52.92
1930-31	75.62	1944-45	120.34
1931-32	61.87	1945-46	63.95
1932-33	90.02	1946-47	35.24
1933-34	119.09	1947-48	69.12
1934-35	58.22	1948-49	85.77
1935-36	87.64	1949-50	83.50
1936-37	49.54	1950-51	67.68
1937-38	53.28	1951-52	52.86

Average for 28 years = 73.92 inches

Abstract of Meteorological Observations made at Northern Sugar Experiment Station, Gordonvale, from 1st July, 1951, to 30th June, 1952.

Month	Rainfall (Inches)	No. of Wet Days	Shade Temperature						Mean Diurnal Range	Mean Tempera- ture 9 a.m.	Mean Per Cent. Relative Humidity 9 a.m.
			Maximum			Minimum					
			High	Low	Mean	High	Low	Mean			
1951											
July ..	0.51	6	86	74	80.6	69	40	55.1	25.5	69.9	78
August ..	0.25	6	93	77	83.8	65	43	56.8	17.0	74.5	73
September ..	3.32	15	91	75	83.6	64	52	60.2	17.2	73.3	75
October ..	1.39	9	95	80	88.5	70	51	61.7	26.8	77.8	80
November ..	2.91	6	95	82	91.0	74	54	66.2	24.7	81.6	81
December ..	0.10	5	100	91	91.16	75	60	67.3	23.8	84.7	68
1952											
January ..	20.03	17	99	86	91.6	76	64	71.15	20.4	82.4	79
February ..	8.35	18	96	86	90.7	79	65	71.0	19.7	80.9	87
March ..	5.90	10	94	84	89.3	73	64	69.4	19.9	80.1	87
April ..	5.25	15	92	83	87.8	75	58	68.5	19.3	77.6	88
May ..	4.29	13	90	75	84.7	73	50	64.6	20.1	74.1	86
June ..	0.56	6	88	74	82.3	68	45	58.3	24.0	70.4	80

There was no visible greyback grub damage in crops this year due to the dry summer and the widespread use of benzene hexachloride. Frenchi grubs also did very little damage.

WORK OF THE STATION

Plant Breeding Work

Fuzz was planted in the glasshouse during the last week in July and subsequently 8374 original seedlings were planted to the field in Divisions D.1 and C.1 at the end of October.

Seedling selection in the 1951 original seedlings resulted in the selection of 183 seedlings which were planted in 30-sett plots. From the 40-sett plots of the previous year 28 varieties were selected for planting in a yield observation trial on Division A.6 using Pindar as a comparative standard; these included 21 "J" seedlings, 5 "K" seedlings, P.O.J.2961 and M.63/39. From the first ratoon yield observation trial of "I" seedlings on Division A.1, three "I" varieties together with two "H" seedlings were planted in a randomised block trial on Division A.3; Trojan was the standard variety in this trial.

Importations

The following canes were received from the quarantine house for breeding work and trial as possible commercial canes: N.Co.291, N.Co.292, N.Co.293, N.Co.334, N.Co.339, N.Co.349, P.O.J.2364, P.O.J.2967, P.O.J.3016, C.P.29-120, C.P.30-24, C.P.36-111, CP.43-64, C.P.44-101, C.P.49-50, B.37-161, Mol.4200, Mol.4357, Mol.4943, Mol.4972, H.37-1933, F.134, U.S.49/7.

Weedicides

Further work on testing a range of weedicides was performed during the year, while 2,4-D was used on a commercial scale on several blocks as a pre-emergence spray. Results were satisfactory and it is intended to replace mechanical weed control methods with chemical ones wherever practicable on the Experiment Station.

Seedling Work at Babinda

Work at the sub-station was continued during the year. Three "J" varieties (J.248, J.234, J.262) and four "K" seedlings (K.803, K.804, K.808, K.809) were selected from the 40-sett plots and planted in a yield observation trial with Badila as a standard.

Thirty-eight "L" seedlings were selected from the two-sett plantings and planted out in 40-sett plots. Approximately 1,000 "M" original seedlings were also planted out in 2-sett plantings.

Experiments harvested during 1951 season

Five seedling trials were harvested during the year. These consisted of a plant trial in the form of a randomised block of Division A.2, a first ratoon randomised block on Division A.5, a plant randomised block at the Babinda sub-station, a plant yield observation trial on Division A.4 and one ratoon yield observation trial on Division A.1.

In the plant randomised block on Division A.2, H.250, H.253, H.302, H.312, and H.365 were compared with Trojan and the trial harvested at 12 months. Both H.253 and H.312 were superior to Trojan at the 1 per cent. level of significance. H.312 has some undesirable characteristics, including large eyes and sprawling habit, and it also tangles badly in the pre-harvest burn. H.253 produced 6.46 tons of sugar per acre while H.312 gave 6.35 tons compared with 4.79 tons produced by Trojan.

In the plant yield observation trial on Division A.4, 21 "I" series seedlings and 5 "J" seedlings were compared with Trojan. Only ten of these canes were equal to or better than the standard in tons of sugar per acre. Selections for further plantings will be made from the mature first ratoon crop during August of 1952.

In the ratoon randomised block on Division A.5 the following canes, viz., G.262, G.270, G.273, G.323 and G.362, were compared with Trojan and harvested at 10½ months. The outstanding variety in the plant crop was G.273 and this performance was repeated in the ratoons. It was superior to all others at the 1 per cent. level of significance in both tons of cane and sugar per acre, yielding a total of 12.71 tons of sugar per acre for the two crops compared with 10.96 tons for Trojan. G.273 has been given the variety number Q.57 and is being rapidly propagated in all northern mill areas. G.270, although yielding well, is too hard for practical purposes.

At the Babinda sub-station a randomised block was harvested as plant cane at the age of 13½ months. In this trial the varieties I.405, I.421 and I.426 were compared with Badila. I.426 was the only variety significantly superior to the standard in both tons of cane and sugar per acre. The yields of sugar produced per acre were as follows: I.426—6.06 tons, I.405—5.48 tons, I.421—5.06 tons and Badila—4.95 tons.

In the first ratoon yield observation block on Division A.1 which was harvested at the age of 10 months, 14 "I" seedlings together with 41MQ.1136 and Ragnar were compared with Trojan. I.222, I.235, and I.245 were the only varieties to outyield the best standard plot in tons of sugar per acre in both plant and ratoon crops, and these varieties have now been carried further to a randomised block trial on Division A.3. The total yields of sugar produced per acre by the two crops are as follows: I.222—11.13 tons, I.235—10.30 tons, I.245—10.21 tons and Trojan—8.44 tons.

Field Day

Field Day was held at Meringa on 23rd May under ideal weather conditions and was well attended by between 350 and 400 growers and other persons connected with the sugar industry. It is pleasing to note that the attendance at these field days is increasing year by year, the gathering on this occasion being a record.

LABORATORY WORK

The following is a summary of cane samples handled during the year:—

Station and trial samples	1,031
Farmers' cane samples	17
Total	<u>1,048</u>

Summary of Crops Grown on the Station

	Tons
Parent canes and trials	481.315
Original Seedlings	52.500
Total	<u>533.815</u>
Plant cane harvested for mill	293.705
Ratoon cane harvested for mill	208.110
Used for samples, plants, and breeding work on station and experimental plots	32.000
Total	<u>533.815</u>

	Acres
Plant cane harvested	12.29
Ratoon cane harvested	10.47
Total	<u>22.76</u>
Average tonnage per acre	<u>23.45</u>

LOWER BURDEKIN SUGAR EXPERIMENT STATION

(G. A. CHRISTIE, Senior Adviser, Officer in Charge)

METEOROLOGICAL AND CROP GROWTH REPORT

In contrast with the excellent distribution of rainfall in the 1950-1951 season, the year under review was characterised by a poor rain distribution, and considerably below average falls for the normal monsoonal period of January, February and March. Weather records from the meteorological screen on the Experiment Station are available from September, 1951, onward, and these are shown below, together with monthly rainfall and number of wet days recorded at Ayr Post Office for the period 1st July, 1951, to 30th June, 1952.

It is of interest to record that a wet year in the Burdekin area usually results in below average crops, while a year of lesser rainfall generally produces heavier tonnages. Under drier conditions, the growth of crops can be controlled at all stages by irrigation, whereas a year of well-distributed rain interferes considerably with farming routine of cultivation and irrigation. On this basis, it is forecast that the crop for 1952 harvest will be above the average of recent years, while the crop harvested in 1951 gave a lower than average tonnage per acre.

Absence of any heavy rain during the spring and early summer months of 1951 provided excellent conditions for harvesting, and while growing crops required frequent irrigation during the warmer months, the response to watering was readily apparent. It was fortunate that no strong winds occurred in the late summer months, for damage by wind to the many heavy cane crops would have been extensive and harvesting difficulties would have been increased.

Following useful rain in January, 1952, wet seasonal conditions seemed to wane, and an earlier soil preparation and planting was possible in areas which are not affected by flooding of the Burdekin River. In areas subject to flooding, cane growers were reluctant to commence soil preparation until all danger of floods had passed. Earlier planting than usual under warm conditions with excellent soil moisture favoured rapid germinations and early growth. Showers during April, May and June were generally sufficient to maintain moisture for the young crops. On the average, these crops are more forward than is usually the case at this time of the year, and they have required very little attention since planting.

Due probably to the dry spring and early summer period, no extensive beetle flight was apparent, though local emergences were probably induced by irrigation. This factor and the more extensive use of BHC in areas likely to be affected, has resulted in greyback grub damage being particularly low throughout the district.

ABSTRACT OF METEOROLOGICAL OBSERVATIONS FROM 1ST JULY, 1951, TO 30TH JUNE, 1952.

	Ayr Post Office				Lower Burdekin Sugar Experiment Station								
Month	Rain in Inches	Wet Days	Rain in Inches	Wet Days	Shade Temperature						Mean Diurnal Range	Mean Temp. 9 a.m.	Mean Humi- dity 9 a.m.
					Maximum			Minimum					
					High	Low	Mean	High	Low	Mean			
1951													
July ..	.11	2			NO	REC	ORDS	AVAI	LABLE				
August ..	.50	3											
September ..	.42	3	.12	1	85	78	82.2	63	50	56.1	26.1	74.7	58.4
October ..	—	—	.06	1	96	82	86.7	69	54	62.1	24.6	80.7	50.9
November ..	.21	1	.20	1	94	87	89.7	71	58	65.0	24.7	83.3	56.1
December ..	.11	2	.32	2	98	90	92.4	84	61	69.6	22.8	85.3	56.0
1952													
January ..	13.86	15	11.51	11	96	81	90.3	75	64	71.5	18.8	82.5	72.3
February ..	4.40	12	3.54	7	92	86	90.1	74	67	70.7	19.4	81.7	74.2
March ..	1.03	6	.80	3	92	87	89.8	72	63	68.6	21.2	81.2	71.4
April ..	2.86	8	3.03	7	91	77	86.3	72	48	65.6	20.7	78.4	70.3
May ..	1.58	7	.50	2	87	75	80.9	69	45	56.0	24.9	73.1	64.4
June ..	1.89	3	1.16	3	84	73	78.5	69	44	51.8	26.7	66.7	68.6

WORK OF THE STATION

The development of this comparatively new Experiment Station has proceeded rapidly through the year, though activities were somewhat hampered by a shortage of farm labour during the latter half of 1951. Anticipating an improvement in the labour position, an area of 22 acres (approx.) was planted in autumn, 1952, all of this being under experiments or propagation of new varieties.

EXPERIMENTS INITIATED DURING THE YEAR

A benzene hexachloride toxicity trial was established with levels of BHC at 125, 100 and 125 lb. per acre of 10 per cent. dust for the plant cane, together with nil, 50 and 125 lb. respectively to the first ratoons. Treatments at these levels were duplicated using crude BHC and refined gamma product, and control plots were included in the experiment. The estimated

amount of BHC, which would remain active in the soil had a previous plant and first ratoon crop been harvested from the field, was applied to the land surface prior to the final preparation, and this gives the effect of having a complete crop cycle prior to the actual planting of the trial.

A weedicide trial using 4 lbs. per acre of 2,4-D in strip form with adjacent untreated strips, was initiated on autumn plant cane. The weedicide was applied by means of a six row boom spray, and under the existing weather conditions, a very effective weed and grass control (pre-emergence spraying) is apparent for the first two months of the trial. The persistence of the weedicide under irrigation is now being investigated in the same block.

A trial to determine various aspects of ratooning in the Burdekin was established in 1950, but at its harvest in 1951, irregularity of soil was apparent. The area was therefore ploughed out after harvest, and following the ploughing under of an exceptionally heavy velvet bean crop, the trial was replanted in April, 1952.

SEEDLING WORK

All other planting on the Station was associated with the raising of seedlings and testing of locally-produced and imported varieties for their suitability under the irrigated Burdekin conditions. A total of 6,084 seedlings, representing 47 trial marriages, were transplanted to the field in May, 1952. Since the glasshouse for this Station has not yet been erected, seedlings were raised at the Northern Experiment Station and forwarded to Ayr by mail train for planting into tubes at this centre.

Of 75 "L" series seedlings selected from this Station's planting in 1951, 31 were re-selected for further trial. In addition to these, three "H" series seedlings from the Northern Experiment Station, which entered the Burdekin through northern and local isolation plots, were planted in a yield observation trial on this Station in May, 1952.

Sixty-one "M" series seedlings from the 1951 Station planting were selected and planted together with 11 varieties of "T" and "J" series seedlings which were received from the Northern Experiment Station through quarantine plots. In addition, varieties received from the quarantine house in Brisbane, were planted, and these include N.Co. canes 291, 292, 293, 334, 339 and 349, B.4098, B.37161, B.41211, B.41227, H.37/1933, Mentor and F.134.

A promising Bureau seedling from the Northern Sugar Experiment Station, Q.57 (previously G.273) has shown excellent agricultural characteristics and reasonably good early sugar content in Burdekin plantings, and this variety is being propagated with a view to releasing it for general planting if it continues to give satisfactory results in the area. Two varieties from overseas, P.O.J.2961 and P.O.J.3016, are also receiving further attention in farm trials.

A building to provide laboratory facilities and office accommodation is at present being constructed on the Station, and when it is completed, it is hoped that services to cane growers in the district can be extended. Concrete seedling benches have been erected and these have assisted considerably in the seedling raising programme of this Station.

Summary of Crops Grown on the Station

Cane harvested for milling	289.66 tons plant cane
Cane used for plants	15.00 tons plant cane
Total	<u>304.66 tons</u>
Total acres harvested	8.84
Average tons per acre	34.46

CENTRAL SUGAR EXPERIMENT STATION

(C. G. STORY, Senior Adviser, Officer in Charge)

METEOROLOGICAL AND CROP GROWTH REPORT

Drought conditions, which commenced in March, 1951, continued throughout the harvesting season until February, 1952. The 25 points of rain for July, 1951, were in contrast to the record figure of 1279 points for July of the previous year. Generally, the cane planted in 1950 produced a very poor crop for harvest in 1951, and this was reflected in the lower district tonnage per acre compared with the average for 1950. The c.c.s. figures for the standover cane in 1951 were better than those obtained on the same blocks, when these were left at the end of the 1950 season.

Five frosts occurred during July; three of these were heavy. The lowest terrestrial thermometer reading was 25.5 degrees on the 22nd. Most of the cane in the Gargett, Pinnacle, Carmila, Rosella and Homebush areas suffered heavy damage. Young plant cane was frosted to the ground, trashed standing cane was ruined for planting material, but ratoon cane from the 1950 late harvested blocks suffered the worst damage. Four more frosts were recorded in August, 1951. The dry conditions continued throughout September, the cane was retarded in growth, blocks cut lighter than estimated and the cane ratooned slowly. Sporadic falls of rain occurred, Proserpine receiving 235 points on the 18th. Summer conditions were experienced in October, and some variable rainfalls included Sarina (356 points), Plewstowe (200 points) and Farleigh (177 points). The drought continued throughout November, which was the only November for fifty years without rainfall. Most of the area missed useful rain in December, although there were good falls at Alligator Creek (450 points) and Gargett-Owen's Creek (340 points). Excellent growth temperatures were experienced but the essential moisture was absent; plant cane was in a better condition than ratoon cane. Rainfall in January was of a variable nature; falls were received in some areas but these were not sufficient to give relief. The crop was backward for this period although the plant cane made some progress following the rain. In mid-February torrential rainfall of up to five inches occurred and this considerably improved the crop situation, the Station and district cane making excellent progress in the following fortnight. No real wet season had been experienced by the end of March and the rainfall for this month was well below the average. In general, however, the cane made good progress from February to April although some growth checks occurred. Soaking rainfall at the end of the second week in June was beneficial to the whole area. The cane crop has done well considering the season; arrowing was heavy in some localities.

Rainfall for the first six months of 1952 was 35.91 inches, with the total of 41.68 inches recorded on 89 wet days for the twelve-monthly period ending June, 1952. Irrigation plants were used to a greater extent than usual during the 1951-52 period.

Aretan treated setts gave excellent results against pineapple disease in blocks which had to be replanted in August and September, 1951. There was a demand for Aretan even in March, 1952, when some undipped early planted cane failed to germinate because of this disease. The practice of treating cane setts with mercurials is becoming more widespread in the Mackay area and both dipping and spraying outfits are used.

Small, almost unnoticed, flights of greyback beetles occurred at the end of November, 1951, with the main flight at the end of January and beginning of February, 1952. The November flight was responsible for most of the damage present on untreated fields in the Cattle Creek-Owen's Creek area and along the Pioneer River. BHC. was applied to 1100 acres for the 1952 harvest and these fields are free from grub damage.

Wallabies severely damaged many fields of young plant and ratoon cane on fringe farms; the Mackay Cane Pest and Disease Control Board paid a bounty on 7,300 scalps during 1951. Coots were responsible for damage to cane in areas adjoining swamps, while cockatoos were troublesome in isolated districts.

There was a widespread army worm outbreak in January-February, 1952. Rats were not prevalent but those present were responsible for "nuisance" damage. The cane killing weed "Striga" affected an area of plant Q.50 at Brightley.

The following meteorological observations were made at the Station during the year:—

Annual Rainfall Since 1935 at the Sugar Experiment Station, Mackay

Year	Rainfall (Inches)	Year	Rainfall (Inches)
1935-36	99.57	1944-45	33.53
1936-37	64.21	1945-46	68.52
1937-38	47.21	1946-47	48.09
1938-39	61.29	1947-48	38.40
1939-40	82.86	1948-49	46.95
1940-41	73.71	1949-50	85.48
1941-42	57.75	1950-51	107.63
1942-43	76.13	1951-52	41.68
1943-44	58.67		

Average for 17 years—64.21 inches

**Abstract of Meteorological Observations Made at the Central Sugar Experiment Station
During Period 1st July, 1951, to 30th June, 1952.**

Month	Rainfall (Inches)	No. of Wet Days	Shade Temperature						Mean Diurnal Range	Mean Tempera- ture 9 a.m.	Mean Per Cent. Relative Humidity 9 a.m.
			Maximum			Minimum					
			High	Low	Mean	High	Low	Mean			
1951											
July	.25	3	79.5	62.5	73.4	67.0	31.5	48.6	24.8	63.7	70.0
August .. .	.06	1	91.0	68.0	77.1	60.5	35.5	47.4	29.8	67.9	57.0
September ..	.98	4	89.5	74.0	78.7	64.5	44.0	55.9	22.8	72.5	62.53
October .. .	.95	3	94.5	77.0	84.72	74.0	54.0	61.2	23.52	78.67	57.46
November ..	—	—	95.5	82.0	88.25	75.5	56.0	65.46	22.79	83.28	53.93
December ..	3.53	11	95.5	79.5	88.82	78.5	60.5	68.98	19.84	83.41	59.71
1952											
January .. .	8.23	12	93.5	80.5	86.51	76.5	65.0	71.14	15.37	82.51	71.19
February ..	13.19	15	90.5	76.0	85.53	77.0	64.0	70.05	15.48	80.79	75.24
March .. .	4.41	13	89.5	81.5	84.0	74.0	60.5	68.8	15.2	78.8	77.0
April .. .	4.47	13	86.5	69.5	82.08	72.4	42.5	65.06	17.02	75.0	79.26
May .. .	1.52	9	85.0	69.0	77.96	70.0	42.0	58.72	19.24	69.45	79.74
June .. .	4.09	5	82.0	67.5	74.86	65.5	38.0	50.43	24.43	64.0	77.6
Totals ..	41.68	89									

WORK OF THE STATION

Experiments Harvested during 1951 Season:—

Six varietal trials were harvested during the 1951 season. These were a yield observation trial on plant cane with "J" seedlings, introduced varieties and Q.50; a first ratoon randomised block trial including six "G" seedlings and Q.50; a first ratoon yield observation trial with "I" seedlings, N.Co.310, D.225 and Q.50; a first ratoon randomised block trial including Q.56, E.119, E.129, E.135, Q.47 and Q.50; and a second ratoon randomised block trial including Co.301, C.P.29/116, Pindar, Q.47, Q.49 and Q.50. In addition to these, section (1) of a long range trial to measure the effect of various crop rotations on soil fertility, a trash trial, filter press mud fertilizer trial, and a "ratoon stunting" disease trial in isolation were harvested. The results of the above-mentioned trials are briefly summarised below.

The yield observation trial on plant cane included 29 "J" seedlings and 11 introductions with Q.50 as the standard variety. The trial made good progress during December and January but with the dry seasonal conditions experienced subsequently a poor yield resulted. The crop was harvested in September, 1951, at the age of 11 months. Only two seedlings, J.127 and J.128, were comparable with Q.50 which gave the best yield in a poor crop of cane. Selections for further trials will be made from the first ratoon crop.

The first ratoon randomised trial contained "G" seedlings (101, 104, 105, 112, 176, 177) and Q.50. These canes ratooned very well and made excellent progress. The trial was out of hand at the end of December, 1950; it produced a fairly good crop and was harvested in October, 1951, at the age of 13 months. G.101 and G.105 outyielded Q.50, but not significantly. These three varieties outyielded G.104, G.176, G.177 at both the 5 per cent. and 1 per cent. levels of significance. The yields in tons of sugar per acre were: G.105 (5.18), G.101 (5.09), Q.50 (4.80), G.112 (4.61), G.104 (3.84), G.176 (3.10), G.177 (2.89). G.105 gave a total yield of sugar per acre for the plant and first ratoon crops of 11.00 tons compared with 10.04 tons for G.101, 9.91 tons for Q.50 and 9.47 tons for G.112. The seedling G.105 has now been designated Q.58.

A first ratoon yield observation trial included 26 "I" seedlings, N.Co.310, D.225 and Q.50. These varieties ratooned well and were out of hand at the end of December, 1950. The trial produced a fairly good crop under the poor seasonal conditions. It was harvested in October, 1951, at the age of 13 months. Six "I" seedlings (106, 120, 126, 150, 162 and I.P. 184) were selected and planted in a replicated trial at Walkerston. I.106 and I.P. 184 were also planted in a yield observation trial at Alexandra. N.Co. 310 was planted in a further replicated trial off the Station.

A first ratoon yield observation trial included 26 "H" seedlings and B.331 with Q.50 as the standard variety. This trial ratooned well and made excellent progress during its early growth. Most of the plots were out of hand at the end of December, 1950. Except for the death of one variety, the crop maintained its condition and was harvested in September, 1951, at the age of 11½ months. Six "H" seedlings (106, 117, 126, 130, 143 and 185) were selected and planted in a replicated trial at Oakenden. H.130 and H.163 were planted in a yield observation trial at Alexandra.

The first ratoon randomised trial included E.119, E.129, E.135, Q.47, Q.56 and Q.50. The trial was ratooned early in November. It made good progress following ratooning until February, 1951. The varieties then maintained condition until harvested in October, 1951, at the age of 12 months. At harvest Q.50 gave the best results with 4.36 tons of sugar per acre but E.129 performed well throughout the period of the trial and yielded close to Q.50 with 4.00 tons of sugar per acre. Q.50 significantly exceeded at the 1 per cent. level and E.129 at the 5 per cent. level of significance, the varieties Q.56, Q.47 and E.119. Variety E.129 was

superior to Q.47 and E.119 at the 1 per cent. level. The yields of the other varieties in tons of sugar per acre were: E.135 (3.82), Q.56 (3.12), Q.47 (2.98), and E.119 (2.78). Q.50 gave a total yield of sugar per acre for the plant and first ratoon crops of 11.24 tons compared with yields of 9.72 tons for Q.56, 9.65 tons for E.129, 8.53 tons for E.119, 8.26 tons for E.135, and 7.28 tons for Q.47.

The second ratoon randomised trial included Co.301, C.P.29/116, Pindar, Q.47, Q.49, and Q.50. This trial was ratooned in November, 1950. The varieties made good progress with the Co.301 out of hand by the end of December, 1950. Pindar showed the effects of dry weather in April. Co.301, C.P.29/116 and Q.50 were obviously the three best varieties in the trial which was harvested in September, 1951, at the age of 10½ months. The yields of these three varieties in tons of sugar per acre were: Q.50 (4.65), Co.301 (4.54), C.P.29/116 (4.49). These exceeded Q.47 (3.08), Pindar (2.66) and Q.49 (2.08) at the 1 per cent level of significance. The plant, first and second ratoon crops of this trial were grown under three different seasonal conditions. Q.50 showed its undoubted superiority in all three crops with a total yield of sugar per acre of 15.03 tons compared with 14.03 tons for Co.301, 13.29 tons for C.P.29/116 and 10.31 tons for Pindar.

The second ratoon crop of Q.50 on section (1) of the long range trial was harvested, the area ploughed and a legume sown. This completed the first cycle of the trial. The other three sections were ploughed in January, 1952.

The first ratoon crop of the trash trial was harvested and the trash was conserved on alternate interspaces.

The filter mud-fertilizer trial was adversely affected by weather conditions in 1950 and due to its uneven stand was ploughed out following harvest.

Legumes

The perennial legumes Centro, Puero and Stylo were originally planted in December, 1949. Three heavy frosts in July, 1951, killed foliage and damaged vines of Puero and Centro and damaged two-thirds of the Stylo.

All three made excellent recovery following the frost damage and moreover, this recovery occurred during a period of severe drought when rainfall for the 5 months was 224 points recorded on 11 days. This suggests that these legumes may be very suitable for Mackay district conditions, if ever long range rotations are adopted on farms. They would also be useful pasture legumes, if not overstocked.

There was a large demand by growers for seed of Reeves' Selection and Cristaudo Pea during 1951. Excellent legume crops were evident in February, the most the district has had for years. Velvet beans again produced good crops under the seasonal conditions experienced. This legume is increasing in popularity but restricted seed supply has limited the area planted.

Alexandra Seedling Plots

The "K" Series seedling double sett plantings were ratooned for selection in 1952. A yield observation trial of "H," "I," "I.P." and "J.P." seedlings from the Experiment Station, Lansdowne Road, and the Alexandra seedling plots was planted on alluvial soil on this seedling sub-station.

Plant Introduction

New varieties introduced from quarantine during the year were: B.37/161, C.P.29/120, C.P.30/24, C.P.36/111, C.P.43/64, C.P.44/101, C.P.49/50, F.134, H.37/1933, Mentor, N.Co.291, N.Co.292, N.Co.293, N.Co.334, N.Co.339 and N.Co.349.

Weedicide Trials

A weedicide trial was established on 7th December, 1951, to observe the effect of 2,4-D on nut grass (*Cyperus rotundus*). The treatments were 1, 2, 3 and 4 lbs. per acre 2,4-D. The plots were resprayed on three occasions.

The effect of the spray varied from six to seven weeks and the density of the nut grass was reduced by each spraying. In addition to controlling nut grass, there was a pre-emergence effect on weed seeds. The treatments at 1 lb. per acre per spray application were as effective as those at the higher concentrations. The information obtained from this trial would allow an alteration in the depth of cover at planting and early cultivation practices with plant blocks on nut grass country in the central area. Contact weedicides consisting of diesel oil emulsions and pentachlorophenol were tried at varying rates: reasonable kills were obtained and these materials have some value for spot spraying work.

A weedicide trial (cultivation versus spraying) was established on half acre sections on a two acre block. Generally the pre-emergence spraying followed by contact spraying was superior to cultivation for the control of weeds, especially where the cane had started to cover across the interspaces. At the end of June, 1952, there was a heavy crop of *Ageratum conyzoides* on the cultivated area while the sprayed section was comparatively clean.

Two acres of pasture land were power sprayed with 2,4-D at the rate of 2 lbs. per acre. This gave a satisfactory control of weeds, killed all the Star Burr (*Acanthospermum hispidum*) and a proportion of the flannel weed (*Sida cordifolia*). District growers are interested in constructing their own power sprays.

Experiments initiated during the year.

These included a yield observation trial with "I.P." and "J.P." Series seedlings, and a soil improvement trial with honey sorghum and velvet beans. In addition, a "ratoon stunting disease" trial was planted in isolation. Seedling selection in the 1951 crop resulted in the selection of 105 seedlings, which were subsequently planted in 30 sett plots. The randomised trials with "H" and "I" Series seedlings were planted in farm trials. This is the first time that randomised seedling trials have been planted off the Station.

Field Day

The 1952 Field Day was held at the Mackay Sugar Experiment Station on the 29th May. There was an attendance of approximately 500 canegrowers, who were conducted on a tour of the Station by members of the Bureau Staff. An excellent display of implements and tractors was provided by Mackay agencies and manufacturers. A feature of the display was a sett cutting saw mounted on a tractor.

LABORATORY WORK

The following is a summary of the c.c.s. analyses carried out during the year:—

Station maturity and trial cane samples	..	..	..	..	1,195
Farm trials	..	..	..	..	296
Farmers' samples	..	..	..	..	52
Show canes	..	..	..	..	47
					<u>1,590</u>

Summary of Crops Grown on Station

Varieties harvested during 1951 season:		Tons
Q.50	..	106.96
Seedlings	..	317.93
Total	..	<u>424.9</u>
Plant cane harvested	..	119.9
First ratoon cane harvested	..	230.81
Second ratoon cane harvested	..	74.18
Total	..	<u>424.9</u>
Total cane harvested for mill	..	424.9
Used for samples, plants and farm trials	..	36.7
Total crops	..	<u>461.6</u>
Total acreage harvested	..	28.71 acres
Average tonnage per acre	..	16.08 tons

SOUTHERN SUGAR EXPERIMENT STATION

(H. G. KNUST, Senior Adviser, Officer in Charge)

METEOROLOGICAL AND CROP GROWTH REPORT

Drought conditions which had set in before the beginning of July continued until the second week of January when good rains were recorded and crops received some relief from the dry conditions. This relief, however, was of a temporary nature only and by the end of February drought conditions again prevailed. Good rains fell during the third week of March and since then rainfall has been well spaced and adequate for crop requirements. Frosts were recorded on seven days in July, 1951, nine days in August, 1951, and five days in June, 1952. Screen temperatures of 29 degrees F. were recorded on two successive mornings in July, 1951, and on five successive mornings in August, 1951, screen temperatures varying from 31 degrees to 33 degrees F. occurred. The frosts which occurred in June, 1952, were light in nature, the lowest screen reading being 37 degrees F.

Crops were severely frosted during July, 1951, foliage and bud damage being very high. Deterioration of the badly frosted, harvested cane was negligible due, no doubt, to the lack of rain, and as a consequence loss of cane from this cause was very slight. Autumn, 1951, plant cane was cut back by frost in both July and August of that year and recovery was slow because of the lack of soil moisture. Ratoons came away satisfactorily but poor soil moisture subsequently retarded growth. Progress in all crops was poor until the permanent relief rains occurred in March although a slight improvement in growth rate occurred after the rains of the second week of January. From the middle of March growth rate has been good and district yields of cane should be slightly better than those of 1951. No crops were damaged by the frost in June, 1952. Arrowing at the end of June was extremely sparse and should not affect yields.

Pre-planting treatment of cane setts with mercurials received greater attention from growers, and good strikes were recorded in all instances where sound planting material was used.

Chemical weed control is now being successfully practised by a larger number of growers and many farm-made, power-driven sprays are working satisfactorily.

During the long dry spell effective irrigation was practised by farmers who owned plants and a considerable number of new plants were installed throughout the district where a good supply of underground water existed. Crop yields will be high on fields which were irrigated regularly while on farms where irrigation plants were installed during the advanced stage of the drought considerable gain is evident as the result of late, regular watering.

Grub damage was more widespread than it has been for some time and was undoubtedly exaggerated by the dry conditions. Unfortunately supplies of carbon disulphide were not available until late summer and very little of the crop was treated as a consequence.

Rainfall Records at the Sugar Experiment Station, Bundaberg, 1914-1952

Year	Rainfall Inches	Year	Rainfall Inches
1914-15	31.99	1933-34	71.45
1915-16	28.54	1934-35	40.01
1916-17	58.08	1935-36	44.24
1917-18	49.85	1936-37	31.65
1918-19	24.24	1937-38	44.40
1919-20	28.20	1938-39	41.01
1920-21	45.16	1939-40	41.69
1921-22	44.97	1940-41	43.26
1922-23	37.14	1941-42	33.52
1923-24	34.16	1942-43	40.75
1924-25	50.96	1943-44	45.22
1925-26	37.62	1944-45	28.14
1926-27	68.18	1945-46	26.10
1927-28	74.69	1946-47	44.52
1928-29	31.16	1947-48	57.76
1929-30	43.16	1948-49	40.18
1930-31	47.19	1949-50	59.31
1931-32	22.88	1950-51	50.74
1932-33	36.81	1951-52	40.42

Average for 38 years—42.60

ABSTRACT OF METEOROLOGICAL OBSERVATIONS MADE AT THE SOUTHERN SUGAR EXPERIMENT STATION, BUNDABERG,
FROM 1ST JULY, 1951, TO JUNE, 1952.

Month	Rainfall (Inches)	No. of Wet Days	Shade Temperature						Mean Diurnal Range	Mean Tempera- ture 9 a.m.	Mean Per Cent. Relative Humidity 9 a.m.
			Maximum			Minimum					
			High	Low	Mean	High	Low	Mean			
1951											
July	.51	4	76	60	71.03	59	29	44.19	26.84	55.93	80.5
August	.62	4	80	68	72.9	61	31	42.41	30.49	57.03	56.51
September	.54	4	85	71	76.43	60	47	52.56	23.87	67.23	69.53
October	.93	9	86	68	79.77	72	53	61.25	18.52	70.67	64.13
November	.62	4	91	75	84.63	76	49	66.16	18.47	77.13	60.16
December	2.09	6	91	80	86.96	77	58	68.58	18.38	78.41	62.96
1952											
January	5.31	10	92	72	86.58	78	65	70.9	15.68	80.09	72.8
February	2.32	11	90	79	85.65	75	63	68.48	17.17	78.44	67.37
March	15.64	11	89	74	82.9	73	55	66.6	16.3	75.19	75.64
April	6.14	12	85	69	80.03	71	43	62.86	17.17	72.2	73.53
May	4	12	79	63	72.64	65	43	57.13	15.51	64.35	82.41
June	1.7	3	78	63	71.43	67	37	46.6	24.83	59.06	73.8
Totals	40.42	90									

WORK OF THE STATION

Plant Distribution

A distribution of Vesta was made to growers in the Bingera area during the spring of 1951, and a total of 41 tons was allotted to 25 applicants.

Plant Introduction

New varieties, B37-161, C.P.29/120, C.P. 30/24, C.P. 36/111, C.P. 43/64, C.P. 44/101, C.P.49/50, F.134, H37-1933, Mentor, N.Co.291, N.Co.292, N.Co. 293, N.Co.334, N.Co.339 and N.Co.349 were introduced from quarantine during the spring of 1951 and planted in Block C.2.

Seedling Selection

Seedling selection in the original "L" seedlings was carried out during August, 1951. A total of 122 seedlings were selected and subsequently planted in 40 sett plots in Block E.1. During September, 86 selections were made and forwarded to Beerwah for propagation.

Thirty-one selections comprising "K" seedlings and canes introduced from Java and from The Colonial Sugar Refining Company nurseries were made from the plant 30-sett plots in Block A.3 and planted in a yield observation trial with Q.47 as the standard in Block B.1.

Experiments Harvested During 1951 Season

Most of the experiments harvested during the year were of the usual type associated with seedling production, selection and testing.

The second ratoon randomised trial with ten "F" seedlings ("F" 14, 16, 18, 25, 27, 31, 33, 35, 49, 60) did not reveal any seedling of commercial promise.

Thirty-one "I" seedlings, N.Co.310 and C.P.34/79 were tested against Q.47 in a first ratoon yield observation trial in Block A.1. Several selections have been made and planted in propagation for future trial work. Parentages of selected seedlings are I.8, I.9, I.14, I.16, I.17, I.18, I.22, I.27, I.28—(P.O.J. 2878 x Co. 290), I.53 —(Co. 419 x C.P.29/116), I.69 —(P.O.J 2875 x Co. 290), I.70—(P.O.J.2878 x 31—2484).

Three "I" seedlings, forty-nine "J" seedlings, with 33SN1882, 39SN3821, 41MQ779, M.171/30, M.134/32, M.112/34, M.165/38 and M.63/39 were tested against Q.47 in plant yield observation trials in Block D.2 and F. Yields of sugar per acre in Q.47 varied from 2.72 tons to 5.83 tons. Two "I" seedlings, four "J" seedlings and 41 MQ 779 gave better yields of sugar per acre than the adjoining plots of Q.47.

Yields from the first ratoon crop of the fourth rotation of the fertilizer and plant residue trial on Block E.4 provided some interesting results. This trial was first planted in March, 1938. The trial area is divided into six blocks, and on two of these the trash is burnt at harvesting, on another two the trash is also burnt but a green manure crop is grown prior to planting, while on the remaining two blocks the trash is turned into the soil and a green manure crop also grown. A fertilizer experiment involving the treatments (a) no fertilizer, (b) potash, (c) phosphoric acid plus potash is superimposed for the plant crop, while in the ratoon crops the following treatments are superimposed, (a) no fertilizer, (b) nitrogen plus potash, (c) phosphoric acid plus potash, and (d) nitrogen plus phosphoric acid plus potash. No significant differences in yield of cane or sugar per acre were recorded between trash treatments. For the fertilizer treatments NPK, NK and PK exceeded no fertilizer at the 1 per cent. level and NPK and NK exceeded PK at the 1 per cent. level in yield of cane per acre. In terms of sugar per acre, NPK, NK and PK exceeded no fertilizer at the 1 per cent. level, NPK exceeded PK at the 1 per cent. level and NK exceeded PK at the 5 per cent level.

New Experiments Initiated During the Year

A benzene hexachloride toxicity trial was established in Block B.3 for the purpose of ascertaining whether this insecticide will, after continued use, adversely affect the growth of cane.

A nitrogen split-application trial was established in Block B.2 to determine the desirability of applying sulphate of ammonia top dressing in more than one application and to compare the effect of early and late applications on c.c.s. content. The effect of splitting the top dressing is to be investigated for two varieties, Q.50 and C.P.29/116.

Legumes

Giru bean was tried out against a velvet bean (Somerset) in Block C.1 but it lacked the vigour of the velvet bean and the yield of green matter per acre was lower.

LABORATORY WORK

The following is a summary of cane and water samples handled during the year:—

Station and trial cane samples	974
Farmers' cane samples	206
Irrigation waters	105

Summary of Crops Grown on Station

Varieties harvested, 1951 season	Tons
Q.47	37.91
Q.49	161.72
Q.55	20.00
C.P.29/116	17.04
P.O.J.2878	80.49
Pindar	15.00
Seedlings	369.57
Total	<u>701.73</u>
Plant cane harvested	168.02
Ratoon cane harvested	413.22
Standover cane harvested	120.49
Total	<u>701.73</u>
Total cane harvested for mill	684.07
Used for samples and plants	17.66
Total	<u>701.73</u>
Total acreage harvested	21.44
Average tonnage per acre	32.73

REPORT ON THE WORK OF THE FIELD STAFF

(H. C. HASKEW, Asst. Agronomist)

SUMMARIES OF GROWTH CONDITIONS IN THE MAJOR DISTRICTS

Cairns District

Rainfall in Babinda was adequate and cane growth excellent. Mossman, Hambledon and Mulgrave were somewhat drier early in the year and relieving rains did not really begin until September for Mossman and January for the other two. The present crop was planted early (virtually completed by April, 1951) and germinated well. Of the earliest planted crops Badila and Pindar were excellent on the red volcanic soils of Babinda and Mulgrave with Trojan only a little slower; Q.50 was more suited to the second class soils.

S.J.4, Badila and Q.50 stood well and were only slightly better than Comus, Pindar, Trojan and Q.44. Q.50 appeared best able to withstand the dry spells mentioned above. Stooling, which had been good to start, was reduced to average by the failure of a proportion of shoots to grow on after dry spells. The comparatively dry conditions in December contributed to the satisfactory ratooning of late harvested cane. Q.50, Comus, Q.44, Eros, Badila Seedling and, in some cases, Pindar arrowed freely. In Badila, Trojan, S.J.4 and Cato arrowing was moderate to light. The only lodging which occurred took place on the better soils of Babinda with Pindar, Badila, Trojan and Q.44 the offending varieties. Harvesting of the 1950-51 crop was begun in June, 1951, and was carried on in ideal weather conditions.

Innisfail District

Rainfall of 117.17 inches for the year was well below average but its distribution, particularly in the spring and summer months of 1951 was most favourable for continuity of growth and for such cultural practices as weed control. Cyclonic conditions were not experienced during the wet season, and in consequence less lodging than normal occurred; crops are unusually good and district mills will crush record tonnages. Ingham was dry until autumn when vigorous growth occurred resulting in crops of usual magnitude but with lower than normal sugar content. Germination was good except in some crops planted during winter in which damage due to "pineapple" disease was experienced. The ratoon crop has grown well. Arrowing was present to some extent in all varieties at the end of June.

Lower Burdekin District

Although the latter half of 1951 was very dry, and a light wet season was experienced, the crop grew rapidly with irrigation. Advantage was taken of the dry conditions to proceed uninterruptedly with the harvest while using irrigation water to maintain growth in young cane. Conditions for planting in March-June, 1952, were good as there was not enough rain to interfere with pre-planting cultivation. As a result soil preparation was better than usual. The use of organic mercurials assisted rapidity and percentages of strikes, and adequate control of weeds by cultivation was possible. The weather during June, being slightly cooler, slowed down growth to some extent.

There was a general absence of cyclonic winds. Lodging of cane was confined to the heavier crops of Trojan, Pindar and H.Q.426 in areas where gusty winds occurred.

Central District

Damaging frosts occurred in July, 1951, but the young cane was able to recover. Little rain fell before January, 1952, and late planted cane was adversely affected, but not to such an extent as young ratoons which were damaged so severely, in some cases, as to require ploughing out and replanting. Rain was fairly regular from January to June resulting in the recovery and subsequent growth of the crop so that there is a reasonable tonnage for harvest later this year. Maturity tests have shown sugar to be low which is to be expected from the late growing conditions.

The c.c.s. figures of all cane crushed in 1951 remained high; this applied also to stand-over cane of which there was a high percentage in all mill areas.

Southern District

Uniform drought conditions were experienced over most of this area during the height of the growing season. Of the 40 inches of rain which fell in Bundaberg during the year only 13 occurred in the first eight months and the remainder was in the last four. Growth was maintained on irrigated farms but only by watering for long hours. Frost damage in the winter of 1951 was severe and c.c.s. figures for the crushing varied greatly, the two varieties Q.47 and Q.50 giving the most uniformly high results.

Nambour and Maryborough suffered from a similar rainfall distribution and from low rainfall during the main growing period. Frosts were very severe until August and brought about heavy decreases in estimated and actual mill crushings for 1951.

The ratoon crop was slow to come away in Maryborough due to frosts but this was not so in Bundaberg. In both places there was a subsequent slowing of growth due to dry conditions. Spring planting of cane was general and successful, but autumn planting was less than

usual due to wet conditions in Maryborough and dry ones in Bundaberg; germination percentages were generally good. Following the end of the dry conditions of January and February growth has been satisfactory but crops are still below average.

SUMMARY OF FIELD TRIALS

As well as the varietal trials, which are described in some detail below, extensive series of trials have been carried out in pursuit of investigations into (a) fertilizer and lime requirements, (b) time of application of nitrogenous fertilizers, (c) trace element requirements, (d) cane diseases and (e) cane insect pests. Each of these are fully explained in other sections of the Annual Report.

VARIETAL TRIALS

Cairns District

(a) This trial was laid out on a grey clay loam derived from schist. An average strike was obtained but wet weather resulted in only moderate stooling. Trojan and 41 M.Q.779 suffered from weed competition due to their slow covering in. Q.50 showed a considerable advantage in yield over all other varieties in this plant crop.

(b) This experiment comprised a second ratoon crop on a red brown loam in which Q.50 was well ahead of all others for total production over the three crops. Even under the comparatively dry conditions experienced Q.50 was slightly lodged and this characteristic may preclude its use on the better soils. 41 M.Q. 779 was level with Q.50 in the plant crop but fell off in each ratoon crop and was 20 tons of cane per acre and 2½ tons of sugar per acre below Q.50 in the aggregate. The seedlings D.221 and D.271 produced 30 tons of cane per acre less than Q.50.

(c) In a plant crop on red volcanic soil Badila was outgrown by the three "I" seedlings—426, 405 and 421. The best of these I.426, lodged somewhat thus decreasing its value compared to Badila.

Three varietal trials planted in 1951 remain unharvested as at the end of June. Two new trials were planted early in 1952. Planting material from 19 seedlings grown at the Northern Sugar Experiment Station during 1950-51 was transferred to the Mossman, Hambledon and Babinda areas for propagation and trial against the standard varieties in each district. A further 27 seedlings from "H," "I" and "J" series have been planted in isolation for later transfer to the same three areas.

Innisfail District

(a) In the plant crop on a grey gravelly to sandy loam the two varieties 41 M.Q.779 and 41 M.Q.764 gave highest yields of cane and sugar but were both prone to lodging or possessed other undesirable features. Q.44 and Trojan, though yielding slightly less, were more favourable agronomically. Q.50 and Pindar yielded least.

(b) In this plant trial on a friable red volcanic loam, I.426 and I.405 produced the heaviest crops. However their lodging characteristics may cancel out their superiority in yield over the other two varieties in the trial, I.421 and Badila.

Lower Burdekin District

(a) Only one varietal trial was harvested—a plant crop on a brown alluvial loam. In this the two varieties F.304 and Q.13 compared favourably with the standard S.J.16. E.269 and E.175 yielded rather poorly.

Two new trials were planted—one on each side of the Burdekin River. Some "G" seedlings and also various introduced varieties are undergoing initial propagation for trial in the area.

Central District

(a) The first ratoon crop of a trial on an alluvial silt loam was harvested. The total result of plant and first ratoon crops shows Q.49, Pindar and Trojan to be superior to the other varieties tested.

(b) This was also a first ratoon crop on a brown sandy alluvium. The two varieties Q.50 and Q.56 were superior, over the two crops, to the other four varieties tested in both cane and sugar production per acre.

Two new trials were planted during the year—one containing the "H" and the other the "I" seedlings selected as being most suitable for the district.

Bundaberg District

(a) This plant varietal trial on a red sandy loam contained four "H" seedlings together with N.Co.310 and Q.47. It suffered from inadequate irrigation and the resultant crop was not good. N.18 produced the best crop but N.Co.310 gave more sugar per acre. Both N.Co.310 and Q.47 showed good frost resistance under conditions where H.47 was heavily damaged.

(b) A trial in the Isis area with N.Co.310, Q.55, Pindar, C.P.29/116, Co.419, and A.147 demonstrated, under dry conditions, the superiority of Q.55 and Co.419. N.Co.310 had high sugar content but arrowed heavily early in the season. A.147 was poor as was also the growth of the standard C.P.29/116.

(c) A ratoon trial on the red volcanic soil of the Isis district included Q.47, Q.50, Q.51, Pindar and C.P.29/116. In the aggregate of the two crops Q.50 and Q.51 were outstanding, with the former showing up most impressively. C.P.29/116 was the best yielder in the ratoon crop and proved its ability to withstand harsh conditions.

(d) The "F" seedlings 14, 18, 15 and 60 in a first ratoon trial failed to measure up to C.P.29/116. They were lower in sugar as well as in tonnage and have now been discarded.

(e) At Bingera, under irrigated conditions, the ratoon of Q.47, Q.50, Q.55, Vestor, Akbar, Eros and Pindar were compared. Q.55 and Vestor were the best performers, but the conditions of the trial suggest that results should be accepted with reservations. The crop followed a standover plant and it was ratooned under very wet conditions.

Nambour District

(a) The only varietal trial harvested in this area was a first ratoon on grey silty loam. N.Co.310 produced most cane and sugar, being appreciably better than Q.50 and Pindar which were its nearest rivals.

There are many propagation plots both here and in Maryborough district. Growth characteristics and yields of these will be noted as part of the normal routine, and eventually selections will be made of those suitable to be tested against standard varieties.

TRIALS AND FIELD WORK CONCERNING GENERAL ASPECTS OF SUGAR CANE AGRONOMY

Green Manure Crops

Velvet bean (*Mucuna Sp.*) is rapidly replacing Poona pea (*Vigna unguiculata*) as the standard legume and, on present indications, will continue to do so throughout the cane growing areas of Queensland—a remarkably cosmopolitan nature for a single variety. In the North, however, Reeve's selection, Cristaudo pea (both *Vigna unguiculata*) and Mung bean (*Phaseolus mungo*) are being planted to some extent.

Weedicides

Trials for the pre-emergence control of all weeds (including grasses) were continued in most areas. Where satisfactory control was obtained in irrigated fields of Bundaberg it was the result of spraying with a solution containing four lb. per acre of 2,4-D immediately prior to the first watering, followed, when weeds began to germinate after watering with a second spray containing pentachlorophenol and the ethyl ester of 2,4-D with a creosote base. A further five irrigations were possible on this field before appreciable loss of control. Loss of control, under whatever conditions it has occurred, is believed to be due to one or more of at least three factors, viz. (a) soil movement and consequent disruption of the surface film of weedicide, (b) faulty initial cover of weedicide, and (c) the germination of deeply placed seeds the growth from which is past the susceptible physiological stage when the soil surface is reached. In the central district trial work was handicapped during the spring and early summer months because of sparse weed germination due to drought conditions. The creosote based contact sprays mentioned above proved unsuccessful against the more resistant grasses. Some success was achieved in small scale trials in which sodium trichloroacetate was used against guinea grass (*Panicum maximum* var.) at the rate of 100 lb. per acre. An attempt is being made to confirm this result.

In the Lower Burdekin district the use to which weedicides may be put is governed by soil characteristics. On one type a very resistant surface crust is formed after irrigation and since cultivation is necessary to reduce it there is little need for weedicides. On another soil it has so far proved impossible to maintain weed control during the practice of irrigation.

Two methods are being used by growers in the Cairns district for incorporation of weedicide use into farm practice. These are (a) an overall spray in places where it is not desired to carry out inter-row cultivation and (b) spraying of the cane row only, in those places where weed growth in the interspaces can be conveniently controlled by cultivation.

Treating cane setts with organic mercurials

These substances were initially used for protection of the planted, ungerminated cane sett against "pineapple" disease (*Ceratostomella paradoxa*) but they are now being credited as a stimulant to germination itself.

The setts may be dipped in the solution of the mercurial or sprayed, as they are planted, by an attachment to the cutter planter. In experiments at Ayr and Mackay up to eight forms of organically combined mercury were tested for their protective qualities. None was found better than Aretan, the commercial preparation at present being used.

Although there is some suspicion that spray methods are not as satisfactory as dipping for control of the organism, in the tests which have been conducted to date no conclusive evidence has yet been obtained that this is the case.

Erosion Control

Erosion control measures are being investigated at Childers, in conjunction with the Dept. of Agriculture and Stock. Intense rains received in March severely damaged partially established earthworks thus increasing the length of time that will be necessary before the degree of effectiveness of the work can be established.

Agonomic Practices

I. Experiments were initiated in an attempt to determine the stage of growth of cane at which it is most profitable to apply sulphate of ammonia.

II. Sulphate of ammonia was applied to growing cane three to four and six to ten weeks before it was due for harvest to determine the effect of such a treatment on germination when the cane was subsequently used for planting material. Ten separate plantings were made but in only one case was a small response noted.



Fig. 3

Clearing land for cane growing in the Cairns district. The expansion of the sugar industry makes bulldozer clearing a commonplace sight to-day. The land pictured here is now under cane.



Fig 4.

Q.57 at Meringa Sugar Experiment Station. Here Mr. J. H. Buzacott, Senior Cane Breeder, examines this most promising seedling. The variety drops its trash during growth.

Cane Breeding

(By J. H. BUZACOTT, Senior Plant Breeder)

The early summer rains in the Cairns district during 1951 promised better growth conditions for the crop than had occurred in the previous year. Almost three inches of rain fell in November and the cane grew rapidly; only a few points were recorded in December, but 20 inches fell in January, and excellent growing conditions seemed assured. Unfortunately the February rainfall dropped to eight inches, whilst in March less than six inches was received. The total rainfall for the first three months of 1952 was only 34.38 inches, compared with an average of 50 inches over the past twenty years, so it can be appreciated that the wet season of 1952 was far from normal.

By the end of March it appeared that growth conditions were so poor and the cane so backward that little arrowing would occur. A rainfall of 5.25 inches in April, which came at a period when flower formation would normally be initiated, improved the position considerably. The spread of the rainfall over fifteen days reduced the average daylight period at this critical time and the result was a much more prolific arrowing season than was at first anticipated. Some of the shy arrowing noble canes such as Q.13 and Korpi did not arrow, but commercial canes including Comus, Pindar, Q.44, Q.50 and Trojan, flowered more freely than they have for several years. Particularly was this so in the wet Babinda and Innisfail districts where large areas of arrowed cane were a feature of the landscape.

The lighting system installed in 1951 season for the purpose of delaying the arrowing of certain early tasseling varieties was again used. This season the lights were operated from late January until mid-April, 1952, and successfully delayed the arrowing of N.Co.310 and a number of C.P. varieties. The lights completely eliminated arrowing in Eros which is normally a free and early flowerer.

Cross-pollination work was again commenced early and the first crosses of the season were made on the 21st May. By the end of that month 69 crosses were in progress and when the cross-pollination work concluded at the end of July, a total of 179 crosses had been made. During the 1952 season very few crosses were made with parents of robustum blood. Although in recent years robustum-noble hybrids containing a high sugar content have been produced, stooling has generally been far from satisfactory. As soon as available the new robustum varieties introduced from New Guinea will be tried as parents to see whether better stooling can be achieved; unless this can be done and a thicker stalk developed, robustum blood will be used in the crossing programme only in very great dilution. One robustum hybrid (U.S.49-7) with a reputation for good stooling was imported from U.S.A. in 1950 and should be available at Meringa as a parent next year. This variety has a low sugar content and may not prove a suitable parent on that account. In view of the unsatisfactory seedlings produced with robustum blood emphasis has been placed on spontaneum lines for 1952, and some new crosses in this field have been made. P.O.J.2967, a recently introduced Javan variety, produced two arrows showing plentiful pollen and these were used to fertilize Q.44 and Trojan.

A few purely noble crosses were made for the Burdekin station and the Babinda sub-station but most of the crosses were made with spontaneum hybrids. Several of these have produced high stooling progeny with a good sugar content and have been outstandingly successful as parent canes in Queensland. Q.28 has in previous years produced very little viable pollen and has never given any progeny when used as a female parent. This year at Freshwater it produced plentiful pollen with a high degree of viability and was accordingly used as a male in a number of crosses. In view of the fact that at least five different types of Badila appear to exist in Queensland an effort is being made to test the value of the several types as parents; arrows of three of them were collected this year and used in crosses. There are indications that Badila Seedling is the type which has in the past normally been used in crossing. A number of "genuine" Badila arrows were obtained from Babinda although they were scarce there. Two arrows of "Thick" Badila were also collected at Freshwater and both were used in crosses. "Burdekin" or "Black" Badila and the Oba Badila from the Burdekin district failed to arrow. It is interesting to note that the arrows of the three varieties which did flower were identical in appearance. A full list of the crosses made for the season appears in Table VIII a.

Most of the fuzz was stored in the special refrigerator at the Meringa Station although a small quantity was retained in cold storage at a Cairns iceworks as a precaution against faulty operation of the new refrigerator. After a settling-in period, however, the new machine performed well and seed stored in it from July, 1951, germinated quite well in February and March, 1952.

Cane fuzz from thirteen different crosses, a list of which appears in Table VIII b, was received from Hawaii. This fuzz will be planted at Meringa and Bundaberg during July, 1952. The crosses were made by the Hawaiian Sugar Experiment Station staff using parental material which might be expected to yield progeny suited to Queensland conditions. It is hoped that some useful types of seedlings will result. Fuzz of a number of crosses made at Meringa in 1951 was despatched to Hawaii for trial in that country.

At Bundaberg and Meringa, fuzz was sown in the glasshouses during July, 1951. Fuzz for the Burdekin area was planted at Meringa during March, 1952, and the Mackay Station

made its sowings during the same month. It is expected that in future years the Burdekin Station will raise its own seedlings as the prefabricated glasshouse purchased in England has now been delivered and is awaiting erection.

After field-planting in 1950 the "L" series of original seedlings at Meringa suffered from heavy rain. This retarded their early growth and when the rainy season of 1951 ceased abruptly in February the seedlings were very backward. As a result they were very poorly grown at selection time. From the 8,582 seedlings represented, 168 were selected. The selections came from 40 families with the highest percentages of selections in the following crosses: Badila x Comus, G.323 x Badila, G.362 x Badila, G.362 x Comus, G.362 x Q.27, H.265 x Comus, H.265 x Q.33, Q.13 x G.270, Q.27 x Comus, Q.27 x G.362 and Trojan x Comus. Poor stooling was a bad feature of most of the crosses represented. At Babinda, 38 seedlings were selected from the 978 planted in the previous year. No less than 10 of the selections came from the cross Q.13 x G.269 mainly because this was one of the few crosses with a reasonably high sugar content. In the Burdekin "L" series the outstanding crosses were Trojan x Q.27, Trojan x Q.33 and I.209 x Badila, and from the total of 3,199 seedlings 75 were selected. At Mackay there were two plantings of original seedlings made in 1950; one was field-planted in August and the other in November. The early planted seedlings made fair growth and produced a crop quite suitable for selection. The late planted seedlings grew very poorly under the dry conditions, and selection was only possible from one or two of the more vigorous families. From the 5,936 seedlings growing in the two plantings, 171 were selected. P.O.J. 2878 x Co. 290 and Trojan x Co. 290 were the outstanding families of the early planted batch, whilst H.265 x P.O.J. 2878 and Q.50 x Q.36, particularly the latter, were the best of the late planted crosses. The Bundaberg "L" series original seedlings were badly frosted during July and many families suffered severe damage. The frost damage rendered selection difficult but it provided valuable information on the relative frost resistance of the families represented in the field. Three crosses which showed remarkable frost-resistance were Co.270 x P.O.J.2878, C.P.36-105 x Eros and Eros x A.130. No less than 15 families showed very bad frost damage with all growing points and foliage killed. The major district cross, P.O.J.2878 x Co.290, showed low resistance whilst that of its reciprocal was fair. From the 5,496 seedlings in the field, 122 selections were made, most of them coming from the crosses, Co.270 x P.O.J.2878, Co.290 x P.O.J.2878, C.P.36-105 x Eros, Eros x A.130, P.O.J.2878 x Co.281, P.O.J. 2878 x Co.290 and Q.50 x Q.36.

At Meringa five "K" series seedlings were chosen from the plant 40-sett plots to plant a yield-observation trial with 24 selections from the "J" series ratoon 40-sett plots. These "K" seedlings all gave high early brix readings. From the fifteen "K" series seedlings in 40-sett plots at Bartle Frere seven were selected and planted in a yield-observation trial. The 167 "K" seedlings in 40-sett plots at Mackay will not be selected until next year whilst at Bundaberg 27 "K" seedlings were selected from the plant 40-sett plots and planted in a yield-observation trial. From a planting of 58 "K" seedlings in the Nambour district four were selected for further propagation.

The "J" series 40-sett plots at Meringa produced 24 varieties for a yield-observation trial. Of the five "J" seedlings which had been selected and planted with the "I" series yield-observation trial in 1950, three outyielded the standard whilst the other two gave excellent early sugar figures. Final selections from there will be made on the ratoon crop this year. The "J" seedlings in a yield-observation trial at Bartle Frere grew poorly and none outyielded Clark's Seedling, although they all outyielded Badila. J.423, with a slightly higher sugar content than Clark's Seedling, equalled the yield of the latter variety in sugar per acre. The "J" seedlings in a yield-observation trial at Mackay produced a poor crop and only J.127 and J.128 gave yields comparable with that of the standard Q.50. Selections will be made from the first ratoon crop. From the ratoon trial at Alexandra containing 36 "JP" seedlings, only three, J.P.164, J.P.176 and J.P.178, were considered worth selecting. They were planted in a yield-observation trial at Alexandra. At Bundaberg, good early growth conditions were experienced for the "J" seedlings in the two yield-observation trials but from February onwards dry weather intervened and yields were low. J.24, J.34, J.42 and J.65 outyielded the standard Q.47 in one of the trials and J.42 produced the highest tonnage of cane and sugar per acre; in the other trial none of the "J" seedlings produced a yield comparable with that of Q.47.

I.222, I.235 and I.245 were selected from the ratoon yield-observation trial at Meringa, and planted in a randomised trial on the Station with Trojan as the standard. These three varieties all outyielded the standard Trojan in the yield-observation trial. "I" seedlings together with a few "J" seedlings were also represented in a plant yield-observation trial which was harvested during the year. A number of the "I" canes in this trial outyielded the standard Trojan but selection will not be made until the ratoon crop.

In the randomised trial of "I" series seedlings at Bartle Frere, I.426 and I.405 both significantly outyielded the standard Badila, but although the former gave a satisfactory performance it is scarcely the type of cane which would be expected to succeed in the Babinda district. The ratoon crop of this trial will be watched with interest.

At Mackay, I.106, I.120, I.126, I.150, I.162 and I.P.184 were chosen from the 26 "I" varieties in the ratoon yield-observation trial and they were planted in a randomised trial at Walkerston. The yield-observation trial of I.P. seedlings on alluvial soil was virtually a failure but seven seedlings, all of the parentage Trojan x Eros, were selected for replanting at Alexandra. At Bundaberg in the ratoon yield-observation trial a number of varieties outyielded the

standard Q.47: I.8, I.9, I.16, I.17, I.22, I.27, I.28, I.53 and I.70 were selected and planted in a randomised trial. Seven of these nine varieties are of the parentage P.O.J.2878 x Co.290, an illustration of the outstanding performance of this cross in the Bundaberg district.

Of the "H" series seedlings at Meringa, H.360 and H.364 were chosen from the ratoon yield-observation trial on good land. These are being propagated on a small scale for trial as early-maturing, Badila-type varieties. In the plant randomised trial H.253 and H.312 were outstanding and outyielded all other varieties, including Trojan, by over seven tons of cane and one and a half tons of sugar per acre. H.312 has very prominent buds and these will probably militate against its success as a commercial cane. Both the varieties are best suited to poor land. Another variety, H.231, was planted in the 1951 randomised trial with the "T" varieties; H.360, referred to above, was also planted in the latter trial. At Mackay only three "H" varieties gave yields comparable with that of the standard Q.50 in the ratoon yield-observation trial. The varieties H.106, H.117, H.126, H.130, H.143 and H.185 were planted in a randomised trial at Oakenden whilst H.130 and H.163 were selected for planting on the alluvial soil at Alexandra. In the ratoon yield-observation trial at Bundaberg several "H" varieties outyielded the standard Q.50. A few were attacked by red rot and H.4, H.6, H.18, H.19, H.20, H.25, H.42, H.45, H.52, H.62, H.64 and H.84 were planted in trials and propagation.

The ratoon randomised trial at Meringa showed G.273 to be the best of the "G" series seedlings. It outyielded all varieties including Trojan by more than one ton of sugar per acre in the ratoon crop and over the two crops was some two tons of sugar per acre better than its nearest competitor. G.273 has been allotted the number Q.57 and is being propagated in all districts. So far it has given an excellent performance in most propagation plots except those in Innisfail in which district it has not performed satisfactorily to date. All other "G" varieties at Meringa have now been discarded.

At Mackay G.101, G.105, and G.112 all outyielded the standard Q.50 in the ratoon randomised trial, but not significantly. These three canes were planted in observation strips on three soil types in the Mackay district. G.105, which has been allotted the number Q.58, appears to be the best of the three varieties.

Among the "F" series seedlings Mackay still has one representative, F.124, and it also has been planted out, with the three "G" seedlings referred to above, on three soil types in the district. At Bundaberg the randomised trial of "F" varieties was carried to second ratoon and no less than five of the varieties outyielded the standard Q.49 over the three crops.

The first ratoon randomised trial of "E" seedlings at Mackay showed E.129 as the best seedling but its yield in both plant and ratoons was well below that of Q.50. It is being propagated to a limited degree for further observation.

Limited plantings of B.331 are still being carried out in the Burdekin district. Its performance this year will decide whether it will be propagated any further. The variety Q.56, which was originally B.174, gave a highly satisfactory performance in field plantings in the Mackay district. In a stand-over trial it heavily outyielded in sugar per acre the varieties Clark's Seedling, Comus, Eros, P.O.J.2725 and Q.50. Unfortunately it has proved to be susceptible to ratoon stunting disease and its planned rapid propagation is being held in abeyance.

VARIETAL STATISTICS

Due mainly to a reduced rainfall smaller crops were harvested throughout the whole State and the production in 1951 was a million and a half tons of cane less than in 1950. The effect was more marked in the central and southern districts which resulted in a higher percentage of the total crop being produced in the North of Townsville and Burdekin districts than in the previous year. This placed the varieties grown in the far North at an advantage when compared with those grown elsewhere. Table IX shows the varietal composition and the distribution of varieties in the four main districts and in the whole State during the 1951 season.

Although almost 300,000 tons less Trojan was harvested than in the previous year the variety still produced more than one million tons. Q.50, its nearest competitor for leading variety of the State, was over 100,000 tons short of this figure. The area under Trojan is still increasing in the Burdekin district and showed an increase north of Townsville in the 1950 harvesting figures. However it must not be forgotten that the cane harvested in 1951 was planted in 1950 and earlier. The north of Townsville plantings of Trojan in 1951 were on a very much reduced scale and much of the area formerly under Trojan was planted with Pindar.

There is strong evidence that Trojan has now reached its peak and is on the decline in several areas. This is due largely to the fact that it had been planted in many instances on unsuitable soil types. On the other hand, plantings of Q.50 are expanding at a rapid rate both on the poor lands of the far North and in the southern districts. It reached the high figure of 70 per cent. of the central district crop and yet was 275,000 tons short of its Mackay-Proserpine tonnage for 1950, when it was only 64.4 per cent. of the crop in that area. Its increase north of Townsville from 8,000 tons in 1950 to 40,000 tons in 1951 and its increase in Bundaberg over the same period from 9,000 tons to 30,000 tons, are worthy of remark. It is anticipated that the first good year throughout the State will show Q.50 well in the lead as the premier variety of Queensland. Badila showed an increase of 0.6 per cent. in the percentage

harvested in 1951. It maintained its figure of 28 per cent. of North of Townsville harvest but dropped almost 7 per cent. in the Burdekin district. In this area it has been replaced largely by Trojan. C.P.29-116 retained its position as fourth variety for the State. Pindar displaced Q.28 for fifth position and almost reached the half million ton mark. This variety should supplant C.P.29-116 in fourth place in the 1952 harvest and may even displace Badila from third position. Q.28, a victim of ratoon stunting disease, continued to lose its position and it is hard to realise that only three years ago it was responsible for half of the total Mackay crop. Comus and P.O.J.2878 maintained the position of seventh and eighth varieties which they held in 1950, although the latter variety represented a lower proportion of the crop in 1951 than in 1950. Q.44, Eros and S.J.16 retained the same positions in relationship to one another but they displaced Q.49 from ninth to twelfth position. The latter variety, represented by a crushing of 167,000 tons in 1950, produced only 79,000 tons for the 1951 harvest. H.Q.426 and Q.47 were the only other varieties which represented more than 1 per cent. of the crop. The remaining varieties call for little comment but two, Ragnar and 41MQ.779, appeared for the first time among listed varieties. It is not anticipated that either of these canes will ever rank high in the tonnage production list for the State.

The composition of the 1951 crop, when considered on the basis of country of origin, underwent relatively slight changes from that of the previous year. Queensland-bred varieties increased by 4.3 per cent. to 68.5 per cent. of the total. This increase would have been greater had Mackay district produced a better crop since 89 per cent. of the total Mackay-Proserpine crop was composed of varieties bred in Queensland. This is easily the highest proportion for

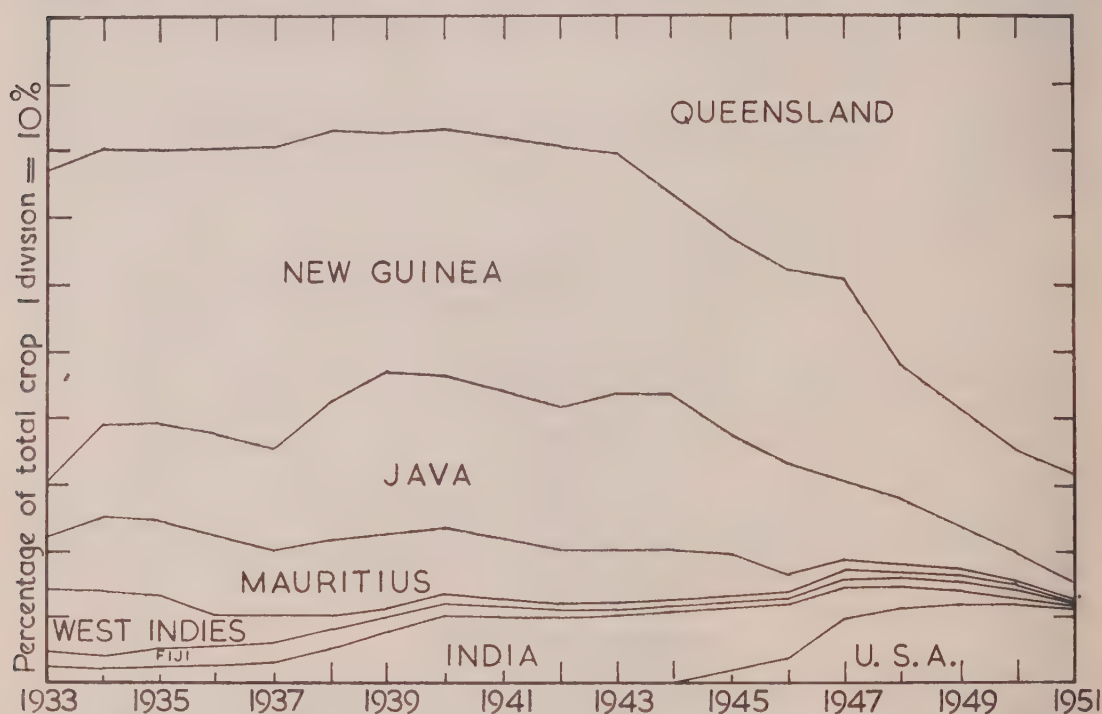


Fig. 5. Showing the composition of the crop on the basis of country of origin from 1933 to 1951.

any of the four major cane-growing districts and naturally when Mackay has a reduced crop the figures for Queensland-bred varieties are affected to a greater degree than those of introduced canes. New Guinea varieties showed a slight increase on the previous year. This was

TABLE VII
Composition of 1951 Crop on Basis of Countries of Origin

Country of Origin	Tons Harvested	% of Crop
Queensland	3,427,529	68.5
New Guinea	815,136	16.3
United States	558,207	11.15
Java	157,317	3.1
India	23,491	.5
Mauritius	13,749	.3
Fiji	6,531	.1
West Indies	3,167	.05
South Africa	45	..
	5,005,172	100.0

because Badila, the sole New Guinea representative, is confined to the northern part of the State which was considerably less affected by the droughty conditions than the other districts. The quota supplied by United States varieties was reduced by some 2 per cent. to 11.15 per cent. of the total, the only representative being C.P.29-116. The proportion of Javanese

varieties dropped also by 1 per cent, but this again was a reflection of the poor season in Bundaberg and Mackay which districts supply some 96 per cent of the P.O.J.2878 grown in the State. Varieties from India, Mauritius, Fiji and the West Indies now supply a negligible fraction of the total and together amount to less than 1 per cent. It is interesting to note that of the varieties listed twenty-eight were bred in Queensland, six in Java, two each in India and the West Indies, and one in each of the remaining five countries represented. Africa is represented for the first time although by a negligible percentage, its representative being the very early maturing N.Co.310. The figures for the varietal composition of the 1951 crop are shown in Table VII, and Fig 6 presents the figures in graphic form.

The continued extension of the areas planted with Q.50 in northern and southern parts of the State and the large acreages planted with Pindar in the northern districts will ensure that the proportion of Queensland-bred varieties will continue to increase for some time to come. C.P.29-116 is however showing some promise in the Mackay district and should this variety become popular there, a proportionate increase in the percentage of U.S.A. varieties will occur. It will be some years though before an area of sufficient size to influence the State percentage can be planted at Mackay, and in the meantime, other new Queensland varieties such as Q.57 are being propagated and will add their share to the already high percentage of Queensland-bred canes.

NEW GUINEA VARIETIES

Of the one hundred and sixty-five varieties sent back to Queensland by the 1951 New Guinea Expedition some one hundred and twenty became established at the quarantine plot at Ormiston near Brisbane and it is expected that these will be distributed to the district experiment stations during this year. Several of the varieties, among which is the large *robustum* clone, 51N.G.91, arrowed during the winter.

TABLE VIIIa

List of Crosses made during 1952 Season

Badila	x Co.290, G.269, Q.27.
Badila Seedling	x Co.290, G.269, Q.27.
Badila ("Thick")	x G.362, Q.27.
Co.270	x Co.290, Eros, P.O.J.2878, P.O.J.2940, Pompey, Q.32, Q.36, Q.1098.
Co.290	x Badila, Q.27.
Co.419	x 37 NG-6.
Co.421	x Comus, Eros, P.O.J.2878, Pompey, Q.36, Q.1098.
C.P.36-105 ..	x Eros, Pompey.
D.285	x Co.290, Comus, C.P.29-116, Eros, G.257, P.O.J.2878, P.O.J.2940, Q.28, Q.36, Q.1098, Trojan, Uba Marot.
Eros	x C.P.36-105, Q.27, Q.28, Uba Marot.
G.217	x Badila Seedling, Co.290, Comus, Eros, G.269, G.362, H.312, P.O.J.2878, P.O.J.2940, Pompey, Q.27, Q.28, Q.36, Trojan, Uba Marot.
G.263	x Co.290, Q.362, Q.28.
G.362	x Badila ("Thick"), P.O.J.2878.
J.331	x Pompey.
J.337	x Co.301, Q.36.
Jason	x Q.36.
Korpi	x Q.27.
K.602	x Badila Seedling, Pompey, Q.27, Q.32, Q.36.
K.630	x Q.32.
N.Co.310	x Co.290, Comus, Eros, P.O.J.2878, Q.33, Q.36, Q.1098, Pompey.
Pindar	x Co.290, P.O.J.2878, Uba Marot, Q.1098.
P.O.J.2364 ..	x Eros, P.O.J.2878.
P.O.J.2725 ..	x Co.290, Co.617, C.P.36-105.
P.O.J.2878 ..	x Co.290, G.362, P.O.J.2940, Pompey, Q.28, Trojan, Uba Marot.
Pompey	x Co.290, C.P.36-105, P.O.J.2878, Q.27, Q.28, Q.36, Q.39, Trojan, Uba Marot.
Q.27	x Badila, Badila Seedling, Badila ("Thick"), Co.290, Comus, Eros, G.217, Korpi, Pompey, Q.31, Q.32, Q.36, Trojan.
Q.28	x Eros, P.O.J.2878, Pompey, Q.32, Q.36, Q.1098, Trojan.
Q.31	x Q.27.
Q.37	x Co.290, P.O.J.2940.
Q.42	x Co.290, Eros, P.O.J.2878, Q.36.
Q.44	x Comus, G.269, G.362, P.O.J.2967, Q.28, Q.36.
Q.49	x Comus.
Q.50	x Comus, Eros, P.O.J.2878, Q.27, Q.36, Q.1098, Trojan.
S.J.4	x Co.290, Comus, P.O.J.2878, Q.27, Q.28, Q.36.
Trojan	x Co.290, Comus, 37 N.G.6, P.O.J.2878, P.O.J.2967, Pompey, Q.27, Q.28, Q.32, Q.1098.
Uba	x P.O.J.2940, Q.32.
Uba Marot ..	x Eros, P.O.J.2878, Pompey, Q.36, Q.1098.

TABLE VIIIb

Crosses Received from Hawaii

B.208	x 44-3114.
Korpi	x 37-1933.
Yellow Caledonia	x 37-1933.
35-198	x 39-3633.
37-1933	x 36-7293, Badila Fiji, B.37-173.
40-1184	x B.6835.
41-6503	x Korpi.
44-2364	x 35-198, 37-1933, 39-5803.
44-3098	x 43-1884.

TABLE IX.—Varietal Composition and Distribution in the Four Main Districts and in the State as a Whole: 1951 Crop

Varieties	North of Townsville		Burdekin and Giru		Proserpine and Mackay		Bundaberg and South		Whole State	
	Tons	%	Tons	%	Tons	%	Tons	%	Tons	%
1. Trojan	749,351	34.0	306,920	41.3	30,921	2.6	6,984	.8	1,094,176	21.9
2. Q 50	39,986	1.8			817,632	70.4	29,609	3.3	887,227	17.7
3. Badila	616,479	28.0	191,955	25.8	6,627	.6			815,061	16.3
4. C.P.29/116					210		557,990	62.1	558,200	11.2
5. Pindar	382,361	17.4	37,800	5.1	3,133	.3	5,740	.6	429,034	8.6
6. Q 28					152,358	13.1	25,223	2.8	177,581	3.5
7. Comus	63,321	2.9	66,321	8.9	28,929	2.5			158,571	3.2
8. P.O.J.2878	2,406	.1	2,613	.4	49,069	4.2			119,663	2.4
9. Q 44	109,647	5.0	25				65,575	7.3	109,912	2.2
10. Eros	100,209	4.6	28				240		100,237	2.0
11. S.J.16			94,660	12.7					94,660	1.9
12. Q 49					35		79,478	8.9	79,513	1.6
13. H.Q.426	62,843	2.9	8,347	1.1	6,056	.5			77,246	1.5
14. Q 47					35		76,965	8.6	77,000	1.5
15. Cato	38,025	1.7							38,025	.7
16. E.K.28			20,983	2.8	12,776	1.1			33,759	.7
17. Q 45					26,819	2.3			26,819	.5
18. S.J.4	23,436	1.1	1,580	.2					25,016	.5
19. Co.290					9,400	.8	11,933	1.3	21,333	.4
20. M.1900					12,659	1.1	1,090	.1	13,749	.3
21. Vesta							10,884	1.2	10,884	.2
22. Q 42							10,478	1.2	10,478	.2
23. S.J.2			9,102	1.2	1,316	.1			10,418	.2
24. Pompey	6,531	.3							6,531	.1
25. Atlas							4,783	.5	4,783	.1
26. Q 25							3,318	.4	3,318	.1
27. P.O.J.2725	215				3,068	.3			3,283	.1
28. B.208			3,060	.4					3,060	.1
29. Orion	2,439	.1							2,439	
30. Q 51							2,227	.3	2,227	
31. Co.301							2,158	.2	2,158	
32. Q 55							1,309	.1	1,309	
33. Q 813					660	.1	232		892	
34. Ragnar	768								768	
35. Q 48							680	.1	680	.3
36. P.O.J.2714			313		161		27		501	
37. Q 54	384								384	
38. Q 10	152								152	
39. 41 M.Q.779	133								133	
40. P.O.J.213							111		111	
41. Others	2,370	.1	340	.1	65		1,106	.1	3,881	
Totals	2,201,056	44.0	744,047	14.9	1,161,929	23.2	898,140	17.9	5,005,172	100.0

Figures exclude 5,018 tons "Condemned" and 26 tons "Lost in transit," 14 tons Unassigned Cane = 5,058 total excluded.

The Division of Entomology and Pathology

(By R. W. MUNGOMERY, Officer in Charge)

GENERAL

Although the dry weather that operated throughout most of the sugar producing areas during the spring-summer period of 1951-52 was responsible for a considerable overall reduction in crop, it proved to be not wholly an unmixed evil, for as a direct result the greyback grub pest in some districts suffered one of the most severe set-backs on record. Elsewhere grub attack by other species was quite limited and the damage caused by other pests was on a greatly reduced scale. From the entomological viewpoint, therefore, the year under review was far from being an unsatisfactory one.

Unfortunately the disease position did not show a parallel improvement, but nevertheless a steady advance was maintained. Chlorotic streak and leaf scald still caused considerable concern in the wetter districts of the State and a small outbreak of leaf scald in the Moreton area further complicated the problem of disease control there. In at least some mill areas there was evidence of a greater awareness of the potential of these diseases in causing losses, and as a result systematic disease surveys and clean seed projects were being inaugurated. During the year a proclamation was gazetted in respect of chlorotic streak disease in the Maryborough mill area; this aimed at the control of the disease by the use of clean planting material and by restricting the ratooning of diseased crops, and the experience gained in this instance will largely influence the scope of the control measures that will have to be undertaken against this disease in other districts.

A somewhat disturbing feature of this year's investigations was the discovery that ratoon stunting disease was more widespread than had hitherto been suspected. The extended incidence of this disease was established as a direct consequence of the detection of associated symptoms which are an easier and quicker means of identification than the long-term method of inoculating into Q.28 setts and awaiting results in the subsequent ratoons. These symptoms which showed evidence of the disease in a number of districts revealed a state of affairs that had no doubt existed for a number of years, rather than a deteriorated disease situation that had rapidly extended from the previously known centres of infection. It will be evident, therefore, that the present situation should not be the cause for any panicky or pessimistic attitude since the disease has apparently been buffered by the presence of tolerant varieties over the years. On the other hand, it does underline the necessity for proceeding with a clean seed campaign in every district where the disease is found. Incidentally this may well provide a partial clue to the gradual and sometimes rapid deterioration that has been noticed in the past in respect of certain varieties at least.

Fiji disease showed a further slight reduction in the number of stools rogued, but next year's figures should provide a truer indication of the progress made against this disease. The reduced incidence of the leafhopper vector because of the droughty conditions, plus the early termination of the 1951 harvest and the timely destruction of diseased fields should have contributed in a large measure towards its eventual elimination from the Bundaberg and Moreton areas.

The rather sudden and wide occurrence of a hitherto little-known *Sclerospora* disease, quite distinct from downy mildew, was thought to have resulted from the 1950-51 floods, but fortunately it is not considered that this disease is ever likely to prove of more than minor importance.

Two years ago with the leasing of portion of the University's farm at Moggill it was planned that the majority of the disease resistance trials would be centred there, and it was confidently anticipated at that stage that this work would proceed uninterruptedly for a number of years. However with the recent expansion of investigational work by the Faculty of Animal Husbandry it was learned that the University would require this land on expiry to the present lease and this led the Bureau to acquire its own property at Eight Mile Plains.

This site retains the advantages of Moggill in being reasonably close to Head Office and in having an excellent water supply for irrigation purposes. In addition it is less subject to severe frosting and it has a more readily workable soil. Bureau ownership of this new property will allow any necessary improvements to be effected as required, and it is felt that the change over will ultimately result in a more orderly expansion of the Bureau's activities in connection with both entomological and pathological investigations.

The erection of two modern glasshouses on the Domain in June was another step in providing additional facilities for pathological research. Unfortunately the gauze screening material for excluding insects was short shipped from England, but once this is fixed in position it will be possible to put the glasshouses into commission for insect transmission experiments and general disease investigations.

In the following, further details are given of the more troublesome pests and diseases which are referred to under their respective headings:—

THE GREYBACK CANE BEETLE, *Dermolepida albohirtum* (Waterh)

The very dry spring and early summer had a profound effect on populations of the greyback beetle by almost entirely eliminating major flights in the Mulgrave and Hambledon

areas, and limiting them in Mossman, Babinda, Innisfail and Tully. In Mossman, Hambledon and Mulgrave further depression of the populations appears to have been effected by desiccation of the eggs and early larval stages. This was confirmed by field diggings in trial areas which disclosed that greyback grubs were practically non-existent in cane fields throughout that tract of country. In Innisfail, where beetle flights were spread over a wide period and were not distinct, the soil did not dry sufficiently to prevent the hatching of the young generation, and where infestations did occur in cane areas they were mostly light and localised, though some of the newly cleared farms in the Mourilyan area suffered damage.

In the Herbert River district grub damage showed up to a greater extent than in the previous year, and losses in Mackay were also heavier, the bulk of the damage occurring in the Cattle Creek section. In the Burdekin infestation was light and the chief inconvenience suffered consisted in odd grubs attacking setts in early planted fields.

BHC. for Greyback Grub Control

In some districts grub damage in the past has been so prevalent as to promote the general use of BHC; in other districts the use of BHC will undoubtedly expand further, its cost as an insurance being sufficiently low when compared with the losses sustained from occasional damage. The substantial loss in the Herbert River district this season, amounting to over 9,000 tons of cane on 1,635 acres is not so surprising since that area has not, up to the present, been subjected to damage so widespread and severe as to impress on the majority of growers the need for BHC protection. The extension of damage into unpredicted localities has been one of the recent factors which have brought about the more general use of BHC in a number of northern areas, and this will doubtless have a similar effect in the Herbert River district. Grub losses on 500 acres in the Mourilyan area, although involving only 1,200 tons of cane, suggests that a greater appreciation of the value of BHC or of the correct methods of application is still necessary amongst at least a section of the growers.

The use of BHC for grub control in cane fields is now so widespread in certain mill areas that grub damage to cane crops is no longer a guide to the status of greyback populations from year to year. As a consequence experimental areas which include untreated soil will be of considerable importance in indicating the fluctuations of infestations. Grub populations determined from these sources together with details in connection with the intensity, duration, and number of beetle flights will prove valuable guides in determining whether the use of BHC should be continued as an insurance against damage, or whether further treatment should be temporarily suspended. This question assumes particular importance in view of the almost complete elimination of the pest from some canefield areas during the past year. However with the pest's high potential for recovery under favourable conditions and the substantial area of untreated land involved in farm paddocks, headlands, and surrounding forest country in which the pest may breed unimpeded, it is felt that complete immunity from harmful grub infestations could not be guaranteed for long. Hence it is considered that each case for treatment or otherwise is a matter for individual decision, the grower being guided largely by any indications of pest increase locally and by advice from the responsible field officer for that district.

The alternative to applying BHC as a preventive would be to postpone treatment until infestation had developed. To date no formulation of BHC or of the newer residual insecticides has yet been found effective if applied after the grubs have become established in the stools. Even if such were available its use would be extremely limited since it is unlikely that the majority of growers would revert to the former practice of applying insecticides during the unfavourable conditions of the monsoonal season.

The mode of application of BHC by canegrowers was in the manner of previous years, i.e., in the half-open planting drill or ratoon furrow, and the recommendation that a single application of 75 lb. of 20 per cent. dust per acre be made to the plant crop to confer protection for three years was more widely but not by any means generally adopted. A number of growers still adhere to the practice of applying a light dressing to the plant crop and follow with a retreatment of the ratoon crop.

In most cases 20 per cent. dusts manufactured from the crude BHC were used, but recent overseas price quotations have indicated that considerable savings are likely to result from the use of dusts made from the more highly concentrated gamma product; hence future usage of BHC is likely to proceed along these lines.

Weather conditions in the spring and early summer allowed field work to proceed without any major interruptions, and the application of BHC was kept well up to schedule. Data compiled from information submitted by Cane Pest and Disease Control Boards indicate that from Mossman to Mackay the area treated with BHC during 1951 was approximately 51,000 acres.

BHC. ratoon re-treatment versus single application on plant crop

Significant differences have not been obtained from the above trials and the policy has been continued of establishing trials annually until results are obtained on different soil types and under different weather conditions. The plant crop yields of two trials harvested on red soils in the Innisfail district that were subjected to very heavy grub infestation suggested rather consistently, but below the level of difference required for significance, that a higher yield was obtainable by applying the heavier single initial treatment, as had hitherto been recommended.



Fig 6.

The new pathology glasshouses nearing completion in Brisbane. These are of British metal frame construction and will be used for disease studies and general agronomic investigations.



Fig. 7.

Downy mildew in New Guinea. The leaf shredding in this wild robustum cane is characteristic of the advanced stage of the disease. The photograph was taken in the Mendi central highland district.

Rates of dilution of BHC. dusts

First ratoon crop yields in 1951 demonstrated no difference in efficacy between 10 per cent. and 20 per cent. BHC. dusts when applied at equivalent rates of active ingredient. The plant crop of one trial showed equal control by 50 per cent., 20 per cent., and 10 per cent. dusts in the presence of a heavy infestation of greyback grubs.

Trials to determine the residual value of BHC.

Trials were set out on fields where records showed that substantial quantities of BHC. had been used in the past. Such trials were to determine whether future applications of BHC. could be reduced in quantity for grub control because of a proportion of the BHC. remaining in the soil from these earlier treatments. Absence of grub infestation prevented these trials being successful in the plant crop; the applications made—from 75 lb. to 150 lb. of 10 per cent. BHC. per acre—were intended to provide protection for three years, so results may be obtained from the ratoons should grub infestation subsequently occur.

Long range BHC. toxicity trial

Trials in areas reputedly free from grub infestation were set out in 1952 to study whether applications of BHC. made over a period of years will lead to lower crop yields because of the accumulation in the soil of products toxic to the cane plant. Various treatment levels, more or less in conformity with farm practices, were tested, and in one set of treatments the dust used was prepared from the crude BHC. containing 13 per cent. gamma isomer which is the basis of dusts in present use for grub control. A second set of treatments, containing equivalent quantities of gamma isomer per acre, were made with dusts prepared from a highly concentrated gamma isomer product, and of course adequate untreated checks were included in the trials.

No toxic effects have been noticed in any of the treatments to date, but should any cumulative toxicity develop from the use of the crude BHC. it is anticipated that any ill effects could be very much lessened by the use of the smaller but equivalent quantity of the concentrated gamma isomer product, particularly since the latter is now being quoted at competitive prices.

Dieldrin and E.605 against greyback grubs

Yields from a trial involving a plant crop showed that dressings of 1 lb., 2 lb., and 4 lb. of dieldrin per acre applied in the form of a dust did not produce any significant difference when compared with the normal BHC. treatment, and observations on the physical appearance of the cane in all plots confirmed that equally good grub control had been achieved in each instance. E.605 at 2 lb., 4 lb., and 8 lb. per acre gave yields which did not differ significantly from those of the BHC.-treated plots, but the physical appearance of the cane and the signs of considerable bandicoot activity in searching for grubs in the E.605-treated plots indicated that grub control was less effective. Actually the BHC. plots yielded 35.42 tons of cane per acre compared with 31.68 for dieldrin and 29.71 for E.605, but the differences were below the 6.34 tons required for significance.

FRENCH'S CANE BEETLE *Lepidiota frenchi* Blkb., AND ALLIED PESTS

Very large flights of frenchi beetles emerged in the southern part of the Mulgrave area in December, 1950, but damage to the 1952 crop by the resulting third stage larvae was quite negligible, apparently as the result of the widespread use of BHC. Information regarding beetle emergences at Mossman in 1950 is lacking, but diggings in untreated trial areas there disclosed little or no frenchi infestation and reports on the 1952 crop state that only 11 acres were damaged. In the Hambledon area, however, damage occurred on 332 acres. This indicates that this district is, currently, most consistently infested by frenchi. The question whether two generations of frenchi will overlap in sufficient numbers as to cause appreciable damage in each succeeding year was answered in that area inasmuch as individual farms there have had substantial emergences of frenchi beetles in three successive years, namely, in 1949, 1950 and 1951. Reports concerning frenchi damage in North Queensland include that caused by grubs of *Lepidiota consobrina* Gir, since these beetles have similar life cycles and overlap in geographical distribution in various localities from Mossman to Mt. Sophia at the eastern end of the Mulgrave mill area.

Elimination of damage by frenchi grubs in the Mulgrave and Fig-Tree Creek areas must be largely attributed to the destruction of the young larvae by BHC. applied primarily for the control of the greyback grub on a three-crop basis, i.e., at the rate of 75 lb. of 20 per cent. dust per acre. The method of applying BHC. in the drill at planting time, developed during 1951 as a safeguard against third stage frenchi, was successfully used in a few instances where a plough-out and replant was involved. This method was extended experimentally to the Bundaberg and Isis areas where droughty conditions during the spring-summer period accentuated the damage by grubs of *Pseudoholophylla furfuracea* Burm and *Lepidiota trichosterna* Lea. Unfortunately the fields in which these trials were established did not suffer infestation; hence no information was forthcoming regarding the efficacy of this method of BHC. application against these southern species.

Emulsified insecticides against frenchi grubs

BHC., Aldrin, Dieldrin, Chlordane, and E.605 were applied as emulsions in water to the top of the soil, and also as soil injections during November in an attempt to control third stage frenchi grubs, but none of the treatments had any noticeable effect. In a similar trial against grubs of *L. trichosterna*, various emulsified forms of BHC. were also ineffective.

SOIL MICRO-FAUNA INVESTIGATIONS

An investigation into the activities of the microscopic soil Anthropods was initiated during the year, and throughout the course of this work particular attention was given to their susceptibility to BHC. as used in standard grub control measures. The main reason for commencing these investigations was to ascertain whether BHC. suppresses some species which are detrimental to cane. This question arose as a result of observations in some of the early BHC. trials where even in the absence of grubs the treated plots sometimes showed better growth than the untreated controls.

The technique of sampling, extraction, identification and counting of these organisms presented considerable problems and a great deal of time was spent in arriving at a satisfactory technique. Samples were taken from existing BHC. trials both in the Mulgrave area and at Bundaberg, and the Anthropods found in these samples comprised representatives of the Chilognatha, Chilopoda, Japygidae, Collembola, and Acarina.

So far results show that the differences in total population levels between treated and untreated plots are not significant and it seems safe to conclude at this stage of the work that the overall effect by BHC. on soil populations of these organisms is probably too small to affect appreciably those that are saprophagous and therefore of importance in the breakdown of plant residues. Future work will concentrate on determining which species are phytophagous and whether these show any significant population differences in treated and untreated plots.

TERMITES

The giant termite, *Mastotermes darwiniensis* Frogg., was reported to have done considerable damage to eighteen acres of young plant cane on one farm in the Lower Burdekin, and small areas of mature cane were tunnelled on several farms. The young plant cane was adjacent to a large area of forest country heavily infested with termites and on which no control measures had been carried out. The extension of canegrowing into new clearings adjacent to termite-infested timber can be expected to produce reports of similar damage by the smaller species of termite in other districts.

Various experiments involving the placement of BHC. as a barrier were set out in an attempt to prevent these pests from invading newly planted fields. It is felt, however, that these measures do not offer the same promise of success as does the systematic destruction of infested timber in the area immediately surrounding the cane lands.

THE FUNNEL ANT *Aphaenogaster* sp.

This ant, which by its subterranean activities causes stunting of cane growth, was active on several farms in the Tully district. Applications of BHC. in the half-open drill at rates of 50 lb. and 100 lb. of 10 per cent. dust per acre failed to reduce appreciably the mound-building activities. An application of 75 lb. of 20 per cent. BHC. dust per acre made in the bottom of the drill before planting appears to have entirely stopped mound-building. The BHC. in this case was slightly covered with soil before the plants were laid and it had no adverse effect on germination; however it was too deeply placed to effect complete control of greyback grubs. As soon as opportunity again permits, experiments will be set out with BHC. applied above the setts, as for third-stage frenchi grub control, in an attempt to control both ants and grubs.

Experimental applications of emulsified chlordane and E.605 were made on the surface of the soil in February after cultivation had ceased. The results failed to indicate any control at the concentrations used.

ARMY WORMS, *Cirphis* spp.

During the period of January to April various reports were received of army worms being prevalent in cane in a number of different centres between Mackay and Cairns, but damage was nowhere considered serious. Specimens submitted for identification showed that the pest involved in each outbreak was *Cirphis loreyi* (Dup.). This is somewhat unusual since *Cirphis unipuncta* (Haw.) is usually the more common of the two. In all cases a high degree of parasitism existed, and growers were advised against using any insecticides to combat these infestations.

MISCELLANEOUS INSECT PESTS

No reports were received of damage by wireworms *Lacon variabilis* Cand., since it is now routine practice to make preventive applications of 10 lb. of 20 per cent. BHC. per acre mixed with fertilizer at planting time to all low-lying fields liable to damage.

The weevil borer, *Rhabdoscelus obscurus* (Boisd.), has remained a minor pest ever since the wide adoption of the present system of pre-harvest burning. Odd borers however were found on some of the newly developed farms in North Queensland.

The larvae of the moth borer, *Phragmatiphila truncata* (Walk.), were fairly prevalent in young cane in the spring, affected shoots being found as usual fairly close to headlands. Some summer generation larvae were found in the more mature cane, but in all instances the infestations were only light.

ANIMAL AND BIRD PESTS

Damage to cane by rats was less in the 1952 crop than in the previous crop, but slight nuisance damage still occurred in many cane fields while more severe damage was confined to favoured habitats bordering creeks and swampy areas.

Wallabies continued to do sporadic minor damage in most areas near their native haunts, but more severe losses were experienced in the Mackay district where they completely destroyed 100 acres of young cane and severely checked a further 500 acres. The damage occurred on farms on the fringe of the forest and grass country, the pests having been forced into the cultivated lands in search of food since prolonged drought had depleted their natural feeding grounds. The Mackay Cane Pest and Disease Control Board paid bonuses for 7,297 scalps. At Ingham, under similar circumstances considerable damage was done by wallabies in the Abergowrie area where many of the newly cleared areas had recently been planted to cane.

The unusually dry weather was also responsible for greater damage by pigs in the Hambledon and Mossman areas. In Mossman the loss was estimated at 200 tons. Control was maintained by shooting and bonuses were paid for scalps as in the case of wallabies.

During the past season coots or redbills, *Porphyrio melanotus* were more than usually active in damaging cane adjacent to rivers, creeks and swamps. In some cases the chief damage was to young shoots of both plant and ratoon cane while in other instances the birds concentrated on pecking at the stubble after harvest until the soft internal fibres were scooped out to a depth of 1-2 inches. At Mackay, strychnine-poisoned corn was used successfully after the birds had first been fed on untreated corn, while at Nambour pieces of cane poisoned with strychnine were equally effective in accounting for large numbers.

RATOON STUNTING DISEASE

When ratoon stunting disease was first recognised as a disease of sugar cane it was observed that if a diseased stick were split longitudinally many of the vascular bundles in the nodal tissues showed an orange-red discolouration. However this discolouration was also observed in cane which, at that time, was believed to be healthy, and it was not considered that this symptom could be used for diagnosing the disease. Further work on this subject, including plantings of cane both with and without reddened vascular bundles, and the inoculation of juice of such canes into healthy Q.28 has since shown that this symptom is a fairly accurate indication of the disease in a number of varieties, such as Q.28, Q.45, Trojan, Badila, H.Q.426 and several experimental varieties.

The disease is now known to occur in all cane growing districts from Proserpine to Rocky Point, and on the basis of the above methods of diagnosis it is present in a number of varieties in the far north. A survey of the districts north of Mackay is to be made in the near future.

Inoculations with juice from numerous varieties into healthy Q.28 have shown that the disease occurs in the field in Q.28, Q.45, P.O.J.2878, Q.813, E.K.28, M.1900 Seedling, H.Q.426, Badila and Trojan and from the symptoms described above it is now apparent that the disease is much more widespread in these varieties than was previously believed. Many other varieties have become diseased as a result of inoculation with diseased juice, these include C.P.29/116 and Q.50, which, however, will have to be studied in a number of different districts before their field reactions to the disease can be stated with any degree of certainty.

The hot water treatments mentioned in a previous report and treatments in a hot air oven have apparently cured the disease at the longer periods of treatment. Crops grown from diseased setts of Q.28 treated as follows have remained healthy for three years: (1) In hot water at 52°C. for 1 hour or 1½ hours, and 54°C. for 1 hour or 1½ hours. Higher temperatures killed a large percentage of the setts, while periods less than those listed above failed to cure all setts that were treated. (2) In a hot air oven at 50°C. for 24 hours and at 54°C. for 8 hours. Hot air at 50°C. for 6 hours failed to cure all the treated setts. Both methods of treatment are now being tried with other varieties.

There is still no evidence that the disease persists in the soil from one crop to the next; but some secondary spread has taken place in the experimental plot, mainly in the lower sections which were waterlogged during the 1950 wet season. With the completion of the new pathology glasshouse this year it will be possible to set out controlled experiments on root and leaf transmission of the disease,

PINEAPPLE DISEASE

The sett-rotting pineapple disease, *Ceratostomella paradoxa* (de Seynes) Dade, occurred in practically all districts of the State when plantings made in the cooler months were not protected by a dip in mercurial solution, although the disease did not cause as much loss as in the more severe winter of 1951. Dipping has already become a regular farm practice on the Burdekin and is becoming increasingly popular in other districts. In the south, many farmers are dipping all setts before planting and the plantations of Fairymead and Bingera have dipped on a large scale. At Mackay, the losses sustained with the 1951 winter plantings led many farmers to treat all setts for the 1952 planting. In the far northern mill areas an increasing number of farmers are finding that the dipping is a payable proposition even in districts such as Innisfail where good germinations are the general rule.

The usual dipping treatment involves the use of a drop planter to put the setts in the ground and many farmers, while realising the benefits to be derived from the mercurial, are loath to abandon their cutter planters. Several have experimented with a system of sprays to wet the sett thoroughly with solution as it drops down the chute of the cutter planter. In one type the solution is recovered through a gauze-covered aperture in the sloping chute; in another the solution runs to waste. More solution is sometimes used by the sprays than by the dip but even so less than 20 gallons per acre of solution, i.e., 1 lb. of a three per cent. mercurial, is required. The chief difficulty with the sprays is to effect an arrangement which will thoroughly wet the freshly cut, top end of the sett as it drops from the knife blade. Strictly comparable conditions are very difficult to obtain for the testing of the sprays against the dip method but experiments have indicated that properly adjusted sprays will give satisfactory germinations under conditions where untreated controls are virtual failures.

Germination trials in the Burdekin and Mackay districts indicated that several mercurial organic compounds may be substituted for the proprietary compound now in general use. Among compounds showing equal efficiency the choice would then be made on price.

FIJI DISEASE

There has been little change in the Fiji disease position in the past year. In the Rocky Point area 103 diseased stools were rogued by the Cane Pest and Disease Control Board; at Moreton, 186 were dug out and in the Bundaberg district 84. Heavy frosts were largely responsible for the shortage of plants for spring planting in the Moreton area and the inevitable use of plants from suspect sources led to the development of the disease in some plant cane. Some 71 stools were removed from plant crops and the remainder from ratoons. Most of the diseased stools were found in the variety C.P.29/116, which occupied 2,997 acres of the 3,825 inspected during the season; the varieties N.Co.310 and Q.50 yielded 19 and 21 diseased stools respectively, a sharp reminder that the disease has to be watched very closely during the propagation of all new canes. The plough-out and harvest order programme for diseased fields at Moreton has been continued in addition to the usual roguing.

At Bundaberg, 84 Fiji diseased stools were found, an indication of the low ebb to which the disease has been reduced in that large district. Sixty-three of these were found on Bingera Plantation where the control of the disease in the heavy crops of irrigated cane presents a special problem; however, 60 of these stools occurred in two blocks indicating that even on the plantation the disease was not spread widely. The 21 stools found off the Bingera Plantation were on individual farms in the Bingera (4 farms), Millaquin (2) and Fairymead (2) mill areas.

The Fiji resistance trial conducted at the Moggill Pathology Plot included mostly advanced seedlings of the Bundaberg "F" and "H" series. The only named cane apart from the standard varieties was P.O.J.2961 which showed itself to be of the same order of susceptibility as P.O.J.2878.

The glasshouse for Fiji resistance trials has been erected at the Domain in Brisbane and it is expected that a planting will be possible in the coming summer.

MOSAIC DISEASE

Active control measures were continued against mosaic disease in the various affected districts. The disease occurs very rarely north of the Burdekin district and in that district it is being reduced by a programme of roguing and clean seed. At Mackay despite the popularity of the susceptible Q.50, the disease has not been allowed to get out of hand and the same applies to the Bundaberg district where infection in propagation plots of that variety forced a rigid control of the planting material. River lands at Bundaberg remain infection pockets of mosaic because the heavy weed growth and consequent rapid spread of the disease make control virtually impossible. The same conditions apply at Maryborough and in the wetter Moreton area and it would appear that very susceptible varieties will never be able to be grown there.

Since mosaic is such a problem over a large part of the Moreton area, recent Bureau mosaic loss trials have been conducted in that district. One included Q.42 and Q.28 and the other Trojan, and in each yields from mosaic-diseased setts were compared with those from healthy setts. The results of the plant crop of Q.42 and Q.28 were detailed in this report for

last year and a significant difference in the case of diseased and healthy Q.42 was recorded. The first ratoon crop suffered from alternate flood and drought and yields were light. Harvest results gave differences significant at the five per cent. level for Q.28 from healthy and diseased plants at the one per cent. level for Q.42. The results from both trials are set out below:—

Variety	Type of Planting Material			
	Diseased		Healthy	
	Plant	Ratoon	Plant	Ratoon
Q.28	40.2	16.6	41.6	20.4
Q.42	33.1	17.1	41.0	22.85

The second ratoon crop shows plainly that the Q.28 at least is affected severely with ratoon stunting disease which of course could have influenced yields of both crops so far harvested.

In the young second ratoons of this trial disease counts were made on individual rows in the replicated plots and it was found that the amount of disease in the row in plots from healthy seed adjoining a diseased plot significantly exceeded the amount in rows at the centre and far side of the same "healthy" plots. This leads to the conclusion that cane to cane transmission of mosaic may be quite important in the Moreton area, although of course this example does not invalidate the widely held belief that grass to cane is the main transmission avenue of cane mosaic.

The trial with Trojan gave very low tonnages in both series in the plant trial and results from the standover ratoons are not yet to hand.

MISCELLANEOUS

For the second year in succession not a single stool infected with downy mildew, *Sclerospora sacchari* T. Miy was found anywhere in the commercial crops of the State. It is as yet too early to conclude that the disease has been eliminated and a close watch is being kept in the Bundaberg district, where the last recorded diseased stool was found. The usual routine downy mildew resistance trial was not planted in 1951 but this was not on account of the apparent absence of disease for it is intended to continue testing all new varieties for an indefinite period. The chief reasons for omitting this particular trial were that the testing of all advanced canes had been carried out and that it had been decided to move the trial from its isolated site in the Bundaberg area to the Pathology Farm at Eight-Mile Plains. Special precautions are being taken to make certain that the fungus is not lost in the transfer.

Yellow spot disease, *Cercospora kopkei* Krug., was less in evidence in the 1952 crop than in the two previous years. Symptoms could be found in practically any field of a susceptible variety in North Queensland but it was doubtful if any losses occurred. The wet season was delayed and when it did come was much lighter than usual; in consequence the disease did not have an opportunity to develop a heavy and widespread infection. The late autumn months were milder and damper than normal and the disease continued to develop well into winter, but even so infection was generally light and it was not common for fields to develop more than a medium-heavy spotting. A spraying trial indicated that spraying with Bordeaux mixture or lime-sulphur may hinder the development of the disease but the proprietary "Thiotox" was ineffective. Lime-sulphur at strength of 1 to 50 of a 22 per cent. polysulphide preparation caused some leaf damage in mature Trojan even in the cooler autumn months.

Leaf-scald disease, *Xanthomonas albilineans* Ashby, which is widespread in most northern mill areas became very noticeable following the droughty early summer. It is a disease which requires dry conditions to become obvious, particularly in a variety such as Trojan in which it can remain masked for long periods. In South Queensland leaf scald has not been reported for many years in commercial cane crops, although it was found in some cow cane in 1949; but in February, 1952, several stools were found in a ratoon crop of seedlings and the variety Trojan in the Moreton mill area. A survey showed that the disease was present in Trojan in small amounts in other parts of the district. It had occurred in the Moreton area many years ago but there had been no positive identification of it for more than 20 years. It is possible that it persisted in odd blocks of the susceptible Oramboo, which has only recently gone out of cultivation, or it may have been carried forward in an inconspicuous form in a variety or succession of varieties over the years and remained unnoticed until a susceptible variety was introduced. Another possible explanation is that the disease was re-introduced with some illicit transfers of Trojan from North Queensland some years ago. As far as is known these unauthorised plantings were all promptly destroyed, but one could have escaped detection or the disease could have become established through knife infection. The outbreak of the disease means that all new canes for the Moreton area will have to be tested for resistance to it before they are released for commercial planting.

The situation with regard to chlorotic streak disease has shown little change over the past year and it is still apparently confined to the far northern mill areas, and Maryborough, Moreton and Rocky Point in the south. At Mossman several farmers treated setts for planting in water at the recommended temperature of 52°C. for 20 minutes but elsewhere control

measures are confined to the use of clean plants and, at Maryborough to restricting the growing of diseased cane beyond the third calendar year after the year of planting, and the prohibition of use of plants from diseased farms. The survey was continued at Maryborough and a total of 82 diseased farms have been found as a result of the two years' operations. Many diseased fields have been destroyed in the meantime so the total of known diseased farms has decreased considerably.

Several chlorotic streak loss trials were harvested during the 1951 crushing in the far north. Results were erratic and definite conclusions could not be drawn, partly on account of some flooding after planting and possibly also on account of the unsuspected presence of ratoon stunting disease in plants from certain sources.

Sclerospora disease was more prevalent than usual in South Queensland.* This disease appears to be associated with flooding and the heavy rains in the previous year may have been responsible for the increase noted this growing season. Diseased stools were rogued from Q.42 on alluvial soil at Maryborough and from C.P.29/116, Pindar, Q.42, Q.47, Q.50 and Trojan at Moreton. The heaviest infection occurred in one acre of first ratoon Trojan from which 40 stools were rogued before the cane got too large for inspection.

Specimens of the disease forwarded to the Commonwealth Mycological Institute, Kew, England, were identified as being nearest *Sclerospora macrospora* on the basis of the oogonial stage and infection on both cane and wild sorghum. It was interesting to note that a preserved specimen of an unknown disease found in Peru and submitted to the Bureau pathologists by Dr. E. V. Abbott, Principal Pathologist of the Division of Sugar Plant Investigations of the United States Department of Agriculture, was recognised as sclerospora disease. This is the first record of the disease outside Australia.

Amongst the miscellaneous diseases recorded during the year were eye spot and ring spot, an unknown stunting disease in Q.50 at Mt. Bauple, South Queensland, a bacterial stripe in N.Co. 310 at Moreton, and poor ratooning in varieties at Mackay and Bundaberg apparently associated with a species of *Verticillium*.

The legume culture service to cane farmers was continued and sufficient inoculum was supplied for the treatment of 310 lb. of Gambia pea, 58 bushels of Mung bean, 96 bushels of velvet bean and 381 bushels of various types of cowpea.

QUARANTINE

A record number of 1,003 setts were distributed from the quarantine house in Brisbane in spring, 1951, after growth under observation for approximately twelve months. All setts were treated in water at 52°C. for 20 minutes before despatch to the stations in the sugar belt, the variety garden at Redland Bay, or the Colonial Sugar Refining Company, Sydney. The canes distributed in Queensland included P.O.J.2364 which had made insufficient growth during its first season in the house, C.P.29/291, C.P.31/294, C.P.36/111, C.P.44/101, C.P.49/50 and U.S.49/7 from the United States of America, F.134 from Taiwan, N.Co.291, N.Co.292, N.Co.293, N.Co.334, N.Co.339 and N.Co.349 from South Africa, B.37161, B.4098, B.41211 and B.41227 from Barbados and C.P.29/120, C.P.30/24, C.P.43/64, H.37/1933, Mentor, Mol.4200, Mol.4357, Mol.4943 and Mol.4972 through the Colonial Sugar Refining Company, Sydney. The crop in the quarantine house at present includes varieties from overseas as well as canes in process of transfer from one State quarantine district to another. One of these canes showed the discoloured vascular bundles of ratoon stunting disease and all setts sent from the house are to receive a curative treatment of 54°C. for an hour.

The canes received from New Guinea during the autumn and winter of 1951 have multiplied to a satisfactory degree. They were watered throughout the severe drought in the latter half of the year and, with only one or two exceptions which had to be destroyed on account of Fiji disease, all canes which germinated have come through to maturity. They have been sprayed at regular intervals with DDT and lime sulphur and apart from some mealy bugs, the normal cane fauna has been kept so completely under control that insects were rarely seen on the cane. Leaf diseases were completely absent. The transmitting leaf hopper was prevented from becoming established by the DDT so the occurrence of Fiji disease did not lead to the jettisoning of the healthy canes, and setts will be distributed this spring. All plantings will of course be under careful scrutiny for another year at least.

Division of Mill Technology

(By J. H. NICKLIN, Senior Technologist (Engineer) and
J. L. CLAYTON (Chief Mill Technologist))

SEASONAL ACTIVITIES

Sugar Deterioration

The investigation into sugar deterioration was continued but the scope of the tests was not so wide as in 1950. Further trials with entire shipments were made at the ports of Cairns and Mackay, but for the most part the investigations were limited to laboratory tests. During the course of the sampling at Mackay the opportunity was taken to observe carefully the storage and handling in the Harbour sheds. A complete report on the work has been presented in Operations Report No. 52/2, the main observations being briefly as follows:—

1. Only one batch of sugar, that from Marian shipped to Vancouver on "Kongsborg" deteriorated, and then only to a slight extent. A shipment of Racecourse sugar on "Binburra" sent to Yarraville consisted of sweated and sound sugar, and there were appreciable differences between the analysis at time of shipment and at the refinery. The possibility of a sampling error cannot be disregarded in this case. The sampling of entire shipments was discontinued after the work at Mackay, and instead tests have recently been made on small batches of sugar in coloured sacks. No results are yet available from these tests.
2. The practices at the Mackay Harbour do not permit of good storage conditions for sugar. Most shed doors are open whenever work is in hand, and the sugar, being exposed to very moist atmospheres, tends to sweat badly.
3. The rapid deterioration tests were continued and it now appears that the results of the 1950 tests were misleading. A period of fourteen days has been found insufficient for the moulds to develop, even under favourable conditions.
4. A disturbing feature of the rapid deterioration tests is that in some cases there is evidence to suggest that reducing sugars produced by sucrose inverting organisms were being consumed by these or other organisms active in the sample. This means that, in future tests, the actual weight of sucrose present at the beginning and the end of the test must be determined.

Clarification Tests with Magnesium Oxide

The early work with magnesium oxide was discussed in Operations Report 51/2, and most of the laboratory work carried out in 1951 was intended to provide information for the factory trial at Rocky Point mill. A considerable amount of time was spent in developing a method of producing active magnesium oxide, when it was found that no commercial material was available in Australia.

A brief factory trial was conducted at Rocky Point mill in October, 1951, and considering the limitations of the plant and procedure which applied during the tests, the operation may be regarded as quite successful. It was established beyond doubt that the process is workable and in many ways is superior to the lime process.

At present the economics of the use of magnesium oxide commercially in the sugar industry are unfavourable, though the position could change if the production of active magnesia on a large scale were developed in Australia. The possibility of using magnesia in admixture with cheaper adulterants is also worthy of further study. A Technical Communication reviewing experiences with magnesia as a clarifying agent is now in course of preparation.

Wax Extraction Plant

As anticipated in the 1951 Report, the wax extraction plant was transferred to the Bundaberg Experiment Station and re-erected in a modified form. The mud is now removed from the extractor by an external scraper elevator instead of the internal vertical screw. The erection of the plant had to await the completion of the season's activities and in the early stages of its operation many difficulties were encountered. However towards the end of the slack season the plant was in working order and some organised tests have been conducted.

Chlorine in Mill Sanitation

A brief trial involving the use of chlorine as a disinfectant at the milling train was conducted at Mossman Mill in September, 1951. Conditions at this mill at the time were decidedly unhygienic, and it was thought that the unusually pronounced drop in purity between first expressed juice and clarified juice might be due to this.

Chlorine was added to No. 4 (the last) mill juice at a rate equivalent to 1.5 p.p.m. of mixed juice, and chlorine water was sprayed regularly over the mills and auxiliary units. For the most part, the chlorine was effective in eliminating obvious signs of bacterial activity but in some locations fermentation could not be suppressed. The abnormal purity relationship persisted, and the trial must be regarded as unsuccessful. Nevertheless, the tests demonstrated that minor outbreaks of bacterial activity at the milling train may be suppressed effectively with the aid of chlorine.

Heat Transfer in Crystallisers

A series of determinations of heat transfer co-efficient in a water cooled crystalliser, which had been the subject of similar tests in the previous season, disclosed a pronounced fall in heat transmission. This is attributed to fouling of the water side of the cooling surfaces, and it is strongly suspected that many other crystallisers in the industry are in a similar condition. The fact that the rate of transfer of heat responded only slightly to changes in the speed of rotation of the elements is consistent with the suspected condition of the cooling surfaces. It was noted, incidentally, that, within practical limits, the power required for rotation of the elements increased practically in linear relationship with the speed of rotation.

Boiler Tests

Tests were carried out on a fire tube boiler of 2,300 sq. feet heating surface at Qunaba and on water tube boilers of 4,020 sq. feet and 6,182 sq. feet heating surface at Millaquin and Racecourse respectively.

The tests were mainly aimed at obtaining information on rates of evaporation under normal mill working conditions. Total feedwater was measured with a Glenfield-Kennedy (positive type) water meter and actual evaporation determined at short intervals by means of an orifice plate in the steam line with tapping points connected to a mercury manometer.

The particular boiler selected was first operated at a draught below normal and in subsequent tests this was increased until the maximum which could be obtained with the existing fan was being used.

Full details of the tests are given in Operations Report No. 52/3, "Boiler Evaporation Tests," but a brief summary of the results obtained is given below.

Qunaba, 2,300 sq. ft. fire tube.—Average evaporation F. and A. 212°F. increased from 3.25 to 4.93 lb. per sq. foot of heating surface per hour as the differential draught was increased from 0.235 to 0.365 in. of water. The average flue gas temperature increased from 518 to 640°F. Furnace draught varied from 1/8 to 3/8 in. water while the maximum draught used at the back of the boiler was 11/16 in. water.

Millaquin, 4,020 sq. ft. water tube.—Excellent results were obtained with this boiler which is arranged with secondary air ports leading into the combustion chamber from the furnace bridge and arch.

Average evaporation F. and A. 212°F. increased from 4.43 to 8.62 lb. per sq. foot of heating surface per hour as the differential draught (taken between combustion chamber and back of boiler) increased from 0.22 to 0.94 in. of water. The average flue gas temperature increased from 510.6 to 647.1°F. The maximum draught used at the back of the boiler was 1 11/16 in. of water.

During the high rating tests the CO₂ was maintained at 15 per cent. or better without unburnt gases showing.

Racecourse, 6,182 sq. ft. water tube.—The fast steaming at Millaquin could not be repeated at Racecourse where the highest rate noted (for a period of 45 minutes during the last test) was 5.61 lb. per sq. foot of heating surface per hour F. and A. 212°F.

Secondary air could not be effectively used at Racecourse whereas at Millaquin the maximum amount available was used to advantage when steaming at the high rate.

An interesting point in connection with these two boilers is that the grate areas and furnace volumes are practically identical although the heating surface at Racecourse is 50 per cent. larger than at Millaquin. At the highest steaming rates noted both boilers produced approximately 34,700 lb. of steam, F. and A. 212°F. per hour.

Condenser Tests

Condenser tests were carried out at Fairymead, South Johnstone, Rocky Point and Racecourse mills. The object of these tests was primarily to determine which type is the most efficient.

In most cases the condensers were found to be operating at higher efficiencies than had been expected. The highest approach temperature noted on the Fairymead effect condenser, which is of the rain type, was 3°F. and most of the time it operated with very nearly a zero approach. The Racecourse and South Johnstone condensers, which are of the tray type, showed maximum approach temperatures of 6°F. and 11°F. respectively at 27 in. vacuum, and averages of 2°F. and 8°F. for vacuums between 26.5 and 27 in. mercury.

Prior to the 1951 season the Rocky Point condenser was altered to a jet ejector type. It is a low level condenser and both tail water and incondensable gases are handled by a wet horizontal vacuum pump. The highest vacuum obtained here was 22.5 in. Hg. and the approach temperatures averaged about 15°F. The water capacity and thus the vacuum are limited by the vacuum pump.

A pan condenser was also tested at Fairymead and South Johnstone. The rain type at Fairymead again gave excellent results and at times showed zero approach temperatures. At South Johnstone the operators limited the vacuum to about 25.5 in. mercury and up to this vacuum the condenser showed practically zero approach temperatures.

At Fairymead and South Johnstone the quantity of injection water was metered and from this weight of water and the ratio of water to vapour as determined from condenser vacua and temperatures the quantity of vapour being condensed was calculated. In all cases these figures showed that the vacuum decreased as the vapour load increased. Whilst this appears quite logical as far as the condenser is concerned, it also means that the pans and efferts give off less vapour at higher vacua. This latter conclusion, being contrary to accepted belief, is to receive further attention in the coming season, when an attempt will be made to measure the actual amount of condensate as a check on the quantity of vapour obtained by calculation.

Electrical

A number of drawings and detailed sketches were made in connection with switchboards which were constructed to Bureau designs.

A visit was paid to Mossman in connection with the commissioning of the 1,000 K.W. turbo set at that factory. It is interesting to note that the closed circuit air cooled alternator of this set is the first of that type to be installed in the Queensland sugar industry. The closed circuit system is probably the most desirable method of cooling large machines and will be used on practically all the eleven turbo sets which are now on order for the industry.

Another novelty at Mossman is the use of 960 r.p.m. direct coupled motors for the top and bottom knife drives. Excellent preparation was being obtained at the time of the visit, there was no undue vibration and it is not anticipated that maintenance will be any heavier than that for a more expensive slow speed drive of 575 or 720 r.p.m.

Minor Activities

Minor items of investigation during the season comprised a series of tests on an Australian diatomaceous earth for use as a refinery filter aid, preliminary investigations into the keeping qualities of samples of first expressed juice, and special visits to four mills where problems of various kinds were studied. As usual, all mills were visited during the season.

ROUTINE WORK AND LABORATORY OPERATIONS

Mutual Control Scheme

It is pleasing to record that, for the 1951 season, all mills except those of the C.S.R. Company participated in the voluntary scheme for interchange of chemical control data. In this season, also for the first time, the data were collected and distributed weekly, and strictly to schedule. The adoption, by most of the mills, of a system of prompt despatch of the weekly figures was very gratifying and there is no doubt that the regular circulation of the assembled data was appreciated in return.

Testing

The number of units of the various classes of equipment tested was as follows: —

Brix spindles, 115; Flasks, 54; Quartz Plates, 3; Polariscopes, 5; Polariscopes Tubes, 98; Refractometers, 6; Thermometers, 34; Weights, 1 set. A new line of 50/55 ml. flasks was examined and tested, and rejected as unsuitable for use in sugar mill laboratories. Five polariscopes were overhauled, one being equipped with a new set of calcite prisms. All of the six refractometers tested were new instruments, three being hand refractometers and the others of the Abbe precision type.

Analyses

The special samples analysed included a deposit from an evaporator save-all, boiler and heater scales, foreign matter causing blockage of fugal backing screens and several sugars and molasses submitted for check analysis.

The methods of determination of the aconitic acid content of factory products were tested, the decarboxylation method proving most satisfactory. The analysis of the few samples of final molasses on hand yielded aconitic acid contents too low to be of commercial interest; later, a general survey is to be made to determine whether this indication is correct.

FACTORY OPERATIONS, 1951 SEASON

In contrast to the 1950 season which was one of the wettest on record, the 1951 season was remarkable as one of the driest. The exceptionally heavy rainfall of December, 1950, and January, 1951, was followed by prolonged dry weather. In the central and southern districts the dry conditions rapidly advanced to the status of full drought, and, as commonly happens in time of drought, severe frosts were experienced in July and August.

Only 5,005,172 tons of cane were crushed, a significant proportion of this being cane stood over from the 1950 season. The yield of 704,342 tons of 94 N.T. sugar was equivalent to 7.11 tons of cane per ton of sugar. Although this quality ratio was superior to those of 1949 and 1950 it was only about equal to the average ratio over the past ten years. The c.c.s. of 14.50 was the highest recorded since 1944, but in the northern and central districts the recovery of sugar per unit c.c.s. was well below normal, and there is a strong suspicion that in these areas the c.c.s. formula gave an inflated estimate of the proportion of recoverable sugar in the cane. Strangely enough, in the southern districts, as in the dry season of 1946, the c.c.s. values were depressed and the mills showed abnormally high recovery figures.

Details of the performances of the mills are set out in the accompanying Tables. Reference to Table XIII shows that the crushing rate fell slightly in the northern and central districts, but there was a distinct rise in the southern district and this made the overall average slightly above that of 1950. The incentive to crush at high rates was not nearly so great in 1951 as in 1950, and the above figures must be viewed in this light. The crushing capacity of nearly all the mills is expanding steadily, as will be revealed when the occasion arises.

By contrast with conditions in 1950, the mills suffered only minor interruptions in cane supply, and with a smaller crop to handle, worked much shorter seasons in 1951. The lost time for cane supply was only 3.29 per cent., and the crop days fell from 6,469 in 1950 to 4,089 in 1951. In some respects, this shorter season was of great advantage as it provided more time for the extensive slack season programme undertaken by many mills.

The quality of the sugar produced was again slightly below that of the previous year. The need to maintain polarisations below the 99 degree limits was stressed regularly during the early portion of the season and appears to have had some effect. It is understood that the regulations in this regard have been modified, the penalty on over-polarisation being remitted, but payment being restricted to a limit of 99 degrees for polarisation. There is a possibility that the decline in sugar quality was not entirely voluntary, and in the central district at least, the unusually refractory nature of the material may have served to impair the normal standard of sugar quality.

The downward trend in the true purity of final molasses was maintained, the average for the State being 44.84 per cent. The northern district mills continued to yield the highest, instead of the lowest, purities mainly because a few mills in that region have not, as yet, entered into the campaign for improved exhaustion of final molasses. Great credit is due to those mills throughout the State, in which the advantages of improved exhaustion have been recognised and great advances already made—not without the expenditure of considerable personal effort on the part of the factory staffs.

The relatively high fibre content of the cane in all districts made the supply of bagasse per cent. cane the highest on record. This is reflected in the low values recorded for added fuel, particularly in the central district. The progress of the transition in the northern district from the soft noble canes to the higher fibred varieties developed of recent years is readily seen in the figures for added fuel per cent. cane in that area. Nowadays, for the major part of the time, the northern district mills find the supply of bagasse adequate to meet fuel requirements, and from now on the use of added fuel there will probably respond mainly to factors influencing the continuity of crushing, as is the case elsewhere.

In general, whilst the 1951 season differed strikingly from 1950, it cannot be regarded as a pleasing season. Although crushing operations proceeded smoothly the cane was in an advanced stage of maturity even at the beginning of the season, and the effort to secure a reasonable co-efficient of work with this raw material proved very trying to the mill staffs. The small crop coinciding with increasing costs of both cane production and sugar manufacture precipitated an economic crisis in the industry and may be responsible for significant changes in the methods by which the price of sugar is determined.

TABLE X
Production Data for the Queensland Mills for Seasons 1945-1951
(Totals and Weighted Averages)

Northern District *

	1945	1946	1947	1948	1949	1950	1951
Cane—							
Tons	1,943,613	1,551,959	1,876,137	2,478,083	2,426,929	2,622,402	2,135,564
Pol per cent.	15.56	16.68	14.81	15.55	15.50	14.40	15.64
Fibre per cent.	10.51	10.57	10.62	10.55	10.58	10.35	11.26
C.C.S.	14.47	15.54	13.66	14.39	14.36	13.21	14.58
Purity first expressed juice	89.75	90.08	88.60	89.24	89.17	87.81	90.08
Sugar—							
Tons 94 net titre	281,998	233,732	255,958	356,969	345,684	344,944	304,786
Cane per ton sugar	6.89	6.64	7.33	6.94	7.02	7.60	7.01
Pol per cent.	98.59	98.70	98.48	98.60	98.42	98.47	98.52
Net titre	97.26	97.45	96.91	97.24	96.99	97.12	97.07
Dilution indicator	31.00	29.00	33.00	30.00	30.00	29.00	28.8
Pol per cent. pol cane	86.72	85.65	84.89	86.60	84.59	85.29	85.39
Mud—							
Tons	31,614	26,009	33,152	37,485	42,450	46,765	38,342
Mud per cent. cane	2.93	3.04	2.85	2.67	3.12	3.10	3.13
Pol per cent.	4.57	3.80	3.41	3.93	3.59	3.66	4.10
Pol per cent. pol cane	.86	.69	.66	.67	.72	.79	.82
Molasses—							
Gallons (1,000's)	4,415	3,980	5,066	6,087	6,143	6,737	4,950
Gallons per ton cane	4.09	4.66	4.36	4.33	4.51	4.48	4.04
Brix	87.14	85.92	86.74	86.40	86.57	86.36	88.82
Apparent purity	35.32	36.18	32.41	33.01	34.15	30.93	33.78
True purity	47.80	48.92	46.47	46.47	47.78	44.73	45.57
Reducing sugars	16.56	14.88	17.50	18.28	17.96	20.97	17.59
Pol per cent. pol cane	5.28	5.52	5.35	5.23	5.68	5.36	4.86
Final Bagasse—							
Tons	234,022	194,494	258,536	308,282	308,622	335,620	295,620
Bagasse per cent. cane	21.68	22.75	22.34	21.93	22.68	22.26	24.14
Pol per cent.	2.72	3.03	2.45	2.86	3.12	3.04	3.09
Dry substance	51.62	50.40	51.04	51.70	50.70	50.49	51.33
Pol per cent. pol cane	3.79	4.13	3.68	4.04	4.75	4.70	4.77
Undetermined Loss—							
Pol per cent. pol cane	3.35	4.01	5.42	3.46	4.26	3.86	4.16
Fuels—							
Tons wood	11,143	10,291	7,389	5,378	5,702	8,768	3,847
Tons coal			16				
Tons molasses	9,951	5,232	9,057	10,691	8,436	16,691	6,577

* The figures for tons of cane, tons of sugar and tons cane per ton of sugar refer to all mills.
All other figures exclude C.S.R. Co. mills.

Central District †

	1945	1946	1947	1948	1949	1950	1951
Cane—							
Tons	1,699,803	1,716,764	1,380,368	2,572,089	2,691,364	2,580,013	1,971,468
Pol per cent.	15.83	15.21	16.44	15.98	15.41	14.96	16.44
Fibre per cent.	12.34	11.34	12.16	12.67	12.10	12.68	13.35
C.C.S.	14.79	13.69	15.36	14.76	14.11	13.93	15.28
Purity first expressed juice	90.48	85.64	90.59	88.85	87.59	89.60	89.66
Sugar—							
Tons 94 net titre	242,673	227,754	204,780	373,003	375,654	355,751	286,416
Cane per ton sugar	7.00	7.54	6.74	6.90	7.16	7.25	6.88
Pol per cent.	98.93	98.87	98.91	98.83	98.96	98.74	98.52
Net titre	97.80	97.63	97.57	97.62	97.91	97.25	96.81
Dilution indicator	25.00	27.00	30.00	28.00	33.00	29.00	28.2
Pol per cent. pol cane	85.75	82.96	82.94	86.46	86.27	86.73	84.12
Mud—							
Tons	64,449	70,807	49,767	83,008	86,934	81,414	64,799
Mud per cent. cane	3.79	4.12	3.61	3.23	3.23	3.15	3.49
Pol per cent.	1.78	2.15	1.88	2.27	2.67	2.67	3.36
Pol per cent. pol cane	.43	.58	.41	.46	.56	.55	.71
Molasses—							
Gallons (1,000's)	7,902	11,147	6,777	13,828	15,387	10,681	9,649
Gallons per ton cane	4.65	6.69	4.91	5.38	5.72	4.14	4.89
Brix	87.46	88.02	88.32	88.83	88.73	88.57	90.33
Apparent purity	38.99	34.44	37.69	35.40	34.11	36.17	35.35
True purity	48.71	45.68		46.56	45.40	45.74	45.01
Reducing sugars	13.54	23.81	14.57	17.30	19.97	16.19	16.49
Pol per cent. pol cane	6.54	8.44	6.51	7.05	7.37	5.73	5.96
Final Bagasse—							
Tons	437,701	426,219	344,687	657,839	697,490	668,330	552,250
Bagasse per cent. cane	25.75	24.82	24.97	25.58	25.91	25.89	27.34
Pol per cent.	2.67	3.03	2.62	2.58	2.67	2.37	2.71
Dry substance	51.43	49.71	52.14	52.99	50.99	51.48	51.71
Pol per cent. pol cane	4.34	4.94	3.97	4.12	4.49	4.04	4.60
Undetermined Loss—							
Pol per cent. pol cane	2.94	3.08	3.17	1.91	1.31	2.95	4.61
Fuels—							
Tons wood	7,240	15,322	4,988	9,315	8,576	10,140	5,084
Tons coal	514	637	271	244	743	528	225
Tons molasses	1,299	1,083	0	40	98	18	0

† 1945-1949 fuel figures exclude Pioneer and Inkerman.

TABLE X.—Continued
Southern District

	1945*	1946†	1947	1948	1949	1950	1951
Cane—							
Tons	908,566	445,752	894,482	1,383,884	1,399,749	1,489,291	898,140
Pol per cent.	14.84	13.23	14.31	14.58	14.07	13.50	14.07
Fibre per cent.	13.97	13.47	14.68	14.23	14.80	14.96	14.56
C.C.S.	13.63	11.54	13.01	13.28	12.83	12.32	12.69
Purity first expressed juice	88.17	81.18	88.05	86.95	87.10	87.10	85.76
Sugar—							
Tons 94 net titre	119,918	50,600	110,920	180,077	175,929	179,149	113,140
Cane per ton sugar	7.58	8.81	8.07	7.68	7.96	8.31	7.94
Pol per cent.	99.09	98.72	99.06	99.10	98.90	98.80	98.80
Net titre	97.95	97.02	96.96	97.96	97.08	97.33	97.24
Dilution indicator	28.00	27.00	25.00	28.00	33.00	34.00	28.6
Pol per cent. pol cane	86.33	81.99	83.86	85.04	85.34	85.32	85.61
Mud—							
Tons	34,716	15,601	30,515	40,951	42,597	52,451	35,971
Mud per cent. cane	3.90	3.69	3.39	3.10	3.09	3.66	4.02
Pol per cent.	3.59	3.20	2.55	3.10	2.99	2.53	2.42
Pol per cent. pol cane	.94	.89	.61	.65	.66	.69	.70
Molasses—							
Gallons (1,000's)	4,139	3,204	4,506	7,242	6,826	6,744	4,445
Gallons per ton cane	4.56	7.14	5.13	5.25	4.88	4.53	4.97
Brix	88.62	88.06	88.58	89.47	89.16	90.75	91.27
Apparent purity	39.15	34.60	38.70	37.40	38.48	37.60	33.84
True purity	47.20	45.04	..	46.39	46.80	45.57	43.72
Reducing sugars	11.08	19.59	13.05	15.35	13.95	14.68	17.81
Pol per cent. pol cane	7.13	11.04	7.85	7.93	7.85	7.55	6.92
Final Bagasse—							
Tons	267,213	126,496	257,705	397,317	416,113	437,610	275,890
Bagasse per cent. cane	29.41	29.20	29.22	29.02	30.22	30.56	30.85
Pol per cent.	2.17	2.14	1.94	2.02	1.95	1.95	2.19
Dry substance	50.20	49.41	51.07	51.98	52.01	51.40	50.47
Pol per cent. pol cane	4.39	4.38	3.87	4.01	4.20	4.42	4.83
Undetermined Loss—							
Pol per cent. pol cane	1.21	1.70	3.81	2.37	1.95	2.02	1.94
Fuels—							
Tons wood	10,351	9,532	4,421	5,925	5,558	3,870	4,306
Tons coal	411	1,001	513	77	88	351	642
Tons molasses	0	0	0	0	0	0	0

* In 1945, mud figures exclude Rocky Point and fuel figures exclude Maryborough.

† In 1946, Mt. Bauple is excluded from mud and fuel figures, and Rocky Point from all except tons cane, tons sugar and tons cane per ton of sugar and fuel figures.

All Queensland Districts

	1945	1946	1947	1948	1949	1950	1951
Cane—							
Tons	4,551,982	3,714,475	4,150,987	6,433,556	6,518,042	6,691,706	5,005,172
Pol per cent.	15.51	15.33	15.34	15.51	15.09	14.52	15.68
Fibre per cent.	12.21	11.44	12.28	12.51	12.41	12.52	12.99
C.C.S.	14.41	13.89	14.18	14.28	13.85	13.40	14.50
Purity first expressed juice	89.70	86.23	89.26	88.47	87.86	88.43	88.93
Sugar—							
Tons 94 net titre	644,661	512,086	571,658	910,049	897,267	879,844	704,342
Cane per ton sugar	7.06	7.25	7.26	7.07	7.26	7.61	7.11
Pol per cent.	98.86	98.80	98.81	98.83	98.81	98.68	98.58
Net titre	97.67	97.36	97.50	97.60	97.75	97.22	96.97
Dilution indicator	28.	28.	30.	29.	31.	30.	28.4
Pol per cent. pol cane	86.17	83.67	85.11	86.16	85.62	86.00	84.79
Mud—							
Tons	130,779	112,417	113,434	161,444	171,981	180,630	139,112
Mud per cent. cane	3.56	3.75	3.31	3.02	3.17	3.27	3.36
Pol per cent.	2.93	2.68	2.51	2.86	2.97	2.88	3.32
Pol per cent. pol cane	.67	.66	.54	.56	.62	.65	.74
Molasses—							
Gallons (1,000's)	16,456	18,331	16,349	27,158	28,356	24,162	19,044
Gallons per ton cane	4.46	6.07	4.78	5.07	5.22	4.33	4.66
Brix	87.67	87.58	87.91	88.46	88.36	88.55	90.20
Apparent purity	38.05	34.84	36.35	35.40	35.17	35.10	34.59
True purity	48.09	46.26	—	46.49	46.22	45.36	44.83
Reducing sugars	13.73	21.18	15.17	16.95	17.84	17.19	17.15
Pol per cent. cane	6.30	7.85	6.45	6.78	7.05	6.07	5.82
Final Bagasse—							
Tons	938,936	747,209	860,928	1,363,438	1,422,225	1,441,560	1,123,760
Bagasse per cent. cane	25.46	24.86	25.16	25.50	26.20	26.11	27.15
Pol per cent.	2.54	2.87	2.36	2.48	2.56	2.40	2.68
Dry substance	51.13	49.86	51.49	52.41	51.25	51.23	51.31
Pol per cent. pol cane	4.17	4.62	3.85	4.07	4.49	4.31	4.69
Undetermined Loss—							
Pol per cent. cane	2.69	3.20	4.05	2.43	2.22	2.97	3.96
Fuels—							
Tons wood	28,734	35,145	16,798	20,618	19,836	22,778	13,237
Tons coal	925	1,638	800	321	1,150	879	867
Tons molasses	11,250	6,315	9,057	10,731	8,534	16,709	6,577

Tons of cane, tons of sugar and tons cane per ton sugar include all mills. All other figures exclude C.S.R. mills only, except—

(1) In 1945, Mud figures exclude Rocky Point and Fuel figures exclude Maryborough.

(2) In 1946, Mt. Bauple is excluded from Mud and Fuel figures and Rocky Point from all except tons cane, tons sugar and tons cane per ton Sugar and Fuel figures.

(3) In 1950 and 1951, Fuel figures include Pioneer and Inkerman. Mt. Bauple excluded from all except tons cane, tons sugar and tons cane per ton sugar in 1950 and from all figures in 1951.

TABLE XI

Sugar Produced in Districts, 1951 Season, with Peak Allocations

District	Tons 94 Net Titre Sugar			Production per cent. Peak
	Produced	Peak	Excess Production over Peak	
Northern	304,786	380,700	— 75,914	80.06
Central	286,416	360,300	— 73,884	79.49
Southern	113,140	175,900	— 62,760	64.32
All Districts	704,342	916,900	— 212,558	76.82

Includes Local Sales, 299 tons

TABLE XII

Tons of Cane per Ton 94 Net Titre Sugar: 1942-1951

Season	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951
Tons cane per ton sugar	7.18	6.98	6.83	7.06	7.25	7.26	7.07	7.26	7.61	7.11

TABLE XIII

Figures for 1951 Season
(Totals and Arithmetic Averages)

	Northern	Central	Southern	All Districts
Tons cane crushed	2,135,564	1,971,468	898,140	5,005,172
Tons 94 N.T. sugar made	304,786	286,416	113,140	704,342
Net titre of sugar	97.04	96.72	97.02	96.89
Tons cane per ton 94 N.T. sugar	7.06	6.89	8.23	7.34
C.C.S. of cane	14.63	15.29	12.70	14.34
Coefficient of work	95.30	94.76	98.19	95.94
Coefficient of work E.S.G.	90.52	90.26	93.50	91.32
Crushing rate	83.98	73.18	59.50	71.47
Lost time per cent. available time	9.48	6.13	8.05	7.49
Fibre of Cane	11.25	13.50	14.56	13.31
Pol of cane	15.67	16.47	14.08	15.55
First expressed juice—				
Brix	20.78	22.59	20.46	21.52
Purity	90.04	89.43	85.70	88.42
Purity—				
Clarified juice	89.36	87.89	84.83	87.29
Syrup	89.19	88.02	84.96	87.35
Dilution per cent. first expressed juice				
Final Bagasse—	27.93	38.59	39.41	36.38
Pol	3.11	2.73	2.33	2.69
Dry Substance	51.74	51.60	51.15	51.49
Pol Extraction	95.33	95.35	94.96	95.23
Reduced Extraction	94.71	95.73	95.78	95.51
Final Molasses—				
Gallons per ton cane	4.25	5.01	5.21	4.89
Brix	88.76	90.04	89.79	89.70
Apparent purity	34.01	35.32	34.50	34.76
True purity	45.31	44.89	44.31	44.84
Reducing sugars	17.73	16.27	17.72	17.12
Final mud—				
Per cent. cane	3.04	3.62	3.49	3.44
Pol per cent. mud	4.45	3.77	2.81	3.63
Sugar—				
Pol	98.51	98.46	98.69	98.54
Reducing sugars	.49	.44	.32	.42
Ash	.20	.26	.27	.25
Moisture	.33	.34	.30	.33
Dilution indicator	29.	29.	30.	29.
Pol balance—				
Sugar (recovery)	84.89	83.93	84.58	84.35
Bagasse Loss	4.75	4.70	5.11	4.84
Molasses Loss	5.09	6.06	7.21	6.19
Mud loss	.80	.76	.71	.76
Undetermined loss	4.47	4.55	2.39	3.86
Bolling house efficiency	93.17	92.39	95.48	93.52
Bolling house efficiency E.S.G.	92.74	91.94	95.13	93.10
Fuels (calculated as equivalent bagasse per cent. cane) --				
Wood	.60	.56	1.36	.82
Coal	.00	.03	.17	.06
Molasses	1.22	.00	.00	.28
Total added fuel	1.82	.59	1.53	1.16
Bagasse	27.17	32.37	34.48	31.82
Total fuel	28.99	32.96	36.01	32.98
Crop days	1,555.3	1,585.5	948.2	4,089.0

TABLE XIV

Average Performance of Queensland Mills, Excluding C.S.R. Coy.'s Mills, 1950 and 1951.
(Arithmetic Averages)

	Northern		Central		Southern		All Districts	
	1950	1951	1950	1951	1950	1951	1950	1951
Cane—								
Pol	14.42	15.67	15.20	16.47	13.61	14.08	14.53	15.55
Fibre	10.44	11.25	12.61	13.50	15.09	14.56	12.87	13.31
Purities—								
First expressed juice	87.84	90.04	89.97	89.43	87.26	85.70	88.64	88.42
Clarified juice	87.61	89.36	88.79	87.89	86.92	84.83	87.94	87.29
Syrup	87.45	89.19	88.84	88.02	86.99	84.96	87.91	87.35
Molasses—								
Gallons per ton cane	4.48	4.25	4.14	5.01	4.51	5.21	4.32	4.89
Apparent purity	31.31	34.01	36.10	35.32	37.85	34.50	35.53	34.76
Recovery overall	85.17	84.89	86.63	83.93	84.94	84.58	85.77	84.35
Recovery overall E.S.G.	84.78	84.49	86.30	83.52	84.63	84.24	85.43	83.96
Recovery on mixed juice	89.36	89.05	90.36	88.02	89.09	89.06	89.74	88.58
Recovery on mixed juice E.S.G.	88.97	88.64	90.01	87.59	88.75	88.70	89.38	88.17
Boiling house efficiency	94.61	93.17	94.58	92.39	94.61	95.48	94.60	93.52
Boiling house efficiency E.S.G.	94.19	92.74	94.22	91.94	94.26	95.13	94.22	93.10
Pol extraction	95.28	95.33	95.87	95.35	95.34	94.96	95.57	95.23
Reduced extraction	94.19	94.71	95.85	95.73	96.34	95.78	95.62	95.51
C.C.S. in cane	13.23	14.63	14.17	15.29	12.43	12.70	13.42	14.34
Coefficient of work	97.47	95.30	97.32	94.76	97.39	98.19	97.38	95.94
Coefficient of work E.S.G.	92.49	90.52	92.54	90.26	92.63	93.50	92.56	91.32

TABLE XV

Cane Milled and Sugar Yielded, 1951 Season

Mills	Tons Cane Crushed	Tons 94 n.t. Sugar made	Tons Cane per ton Sugar	
			1951	1950
Mossman	111,119	15,263	7.280	7.880
Hambledon	197,082	29,634	6.651	6.874
Mulgrave	223,974	32,668	6.856	7.267
Babinda	187,205	25,063	7.469	8.324
Goondi	185,098	25,174	7.353	8.184
South Johnstone	181,443	38,949	7.000	7.929
Mourilyan	272,658	25,032	7.248	7.551
Tully	248,046	34,281	7.236	7.674
Victoria	279,713	42,039	6.654	7.356
Macknade	249,226	36,641	6.802	7.424
Local Sales	—	42	—	—
Northern District Totals and Averages	2,135,564	304,786	7.007	7.602
Invicta	94,638	14,440	6.554	6.743
Pioneer	202,238	29,395	6.880	7.011
Kalamia	198,349	30,278	6.551	6.859
Inkerman	314,500	44,982	6.992	7.058
Proserpine	165,780	24,083	6.884	7.157
Cattle Creek	66,772	9,338	7.151	7.457
Racecourse	185,356	26,668	6.950	7.436
Farleigh	181,401	25,804	7.030	7.548
North Eton	84,400	12,098	6.976	7.298
Marian	154,063	22,143	6.958	7.479
Pleystowe	190,238	27,761	6.853	7.472
Plane Creek	133,733	19,270	6.940	7.545
Local Sales	—	156	—	—
Central District Totals and Averages	1,971,468	286,416	6.883	7.252
Qunaba	71,151	8,578	8.295	8.846
Millaquin	174,042	22,499	7.647	8.382
Bingera	190,881	23,888	7.991	8.342
Fairymead	141,648	17,788	7.963	8.515
Gin Gin	43,361	4,957	8.747	8.540
Isis	151,260	19,903	7.600	8.038
Maryborough	47,052	6,089	7.727	7.776
Mount Bauple *	—	—	—	8.884
Moreton	70,447	8,495	8.293	7.772
Rocky Point	8,298	842	9.855	9.827
Local Sales	—	101	—	—
Southern District Totals and Averages	898,140	113,140	7.938	8.313
All Districts Totals and Averages	5,005,172	704,342	7.106	7.605

* Mt. Bauple did not crush: Crop sent to Maryborough Mill.

TABLE XVI

Average Crushing Rates, 1942-1951, excluding C.S.R. and Rocky Points Mills
(Arithmetic Averages)

	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951
Tons Cane per Hour	55.93	55.45	57.33	59.32	59.48	60.55	66.33	68.74	72.35	71.47

Total Crop Days, All Mills, 1942-1951

	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951
Total Crop Days	4,432	4,270	4,749	4,872	3,740	4,289	5,708	5,593	6,469	4,089

TABLE XVII

Analysis of Gross Time, Excluding C.S.R. Mills, 1951 Season

	Total Hours	Per Cent. Gross Total Hours	Per Cent. Available Hours
Crushing Time	55,458.8	66.81	92.98
Lost Time—			
Manufacture	2,224.2	2.68	3.73
Cane Supply	1,963.0	2.36	3.29
Total Available Time	59,646.0	71.85	100.00
Premeditated and Week-end Stops	23,368.2	28.15	—
Gross Total Hours	83,014.2	100.00	—

TABLE XVIII

Fuels Calculated as Equivalent Bagasse Per Cent. Cane, 1942-1951
(Arithmetic Averages)

Year	Wood	Coal, etc.	Molasses	Total Added	Bagasse	Total Fuel
Northern District						
1942	1.243	..	2.276	3.519	21.637	25.156
1943	1.410	..	2.224	3.634	23.182	26.816
1944	1.063	..	1.770	2.833	22.633	25.466
1945	1.830	..	1.552	3.382	23.021	26.403
1946	2.287	..	1.088	3.375	22.858	26.233
1947	1.167	.005	.913	2.085	22.988	25.073
1948	.672	..	1.535	2.207	23.063	25.270
1949	.726	..	1.102	1.828	23.242	25.070
1950	1.050	..	1.878	2.928	24.468	27.396
1951	.598	..	1.220	1.818	27.169	28.987
Central District						
1942	1.224	.046	.217	1.487	26.254	27.741
1943	2.589	.189	.198	2.976	26.163	29.139
1944	1.995	.131	.180	2.306	27.061	29.367
1945	1.372	.092	.326	1.790	28.144	29.934
1946	2.730	.132	.132	2.994	25.183	28.177
1947	1.487	.025	.019	1.531	28.068	29.599
1948	1.617	.037	.002	1.656	28.497	30.153
1949	.899	.153	.005	1.057	27.397	28.454
1950	.763	.053	.001	.817	29.731	30.548
1951	.564	.028	..	.592	32.369	32.961
Southern District						
1942	3.197	.183	..	3.380	30.325	33.705
1943	5.385	.380	..	5.765	29.358	35.123
1944	4.306	.151	..	4.457	29.326	33.783
1945	3.565	.059	..	3.624	30.550	34.174
1946	5.693	.697	..	6.390	29.341	35.731
1947	3.785	.141	..	3.926	30.388	34.314
1948	1.977	.009	.012	1.998	31.010	33.008
1949	1.633	.016	..	1.649	32.138	33.787
1950	.694	.060	..	.754	35.285	36.039
1951	1.362	.164	..	1.526	34.485	36.011
All Queensland Districts						
1942	1.939	.084	.633	2.656	26.612	29.268
1943	3.313	.212	.613	4.138	26.598	30.736
1944	2.603	.107	.497	3.207	26.814	30.021
1945	2.218	.058	.524	2.800	27.781	30.581
1946	3.516	.270	.341	4.127	25.842	29.969
1947	2.238	.062	.226	2.526	27.684	30.210
1948	1.519	.018	.374	1.911	28.098	30.009
1949	1.122	.067	.266	1.455	28.106	29.561
1950	.808	.043	.434	1.285	30.225	31.510
1951	.818	.063	.282	1.163	31.820	32.983

